

Exploring Biodiversity

Rhoda MacDonald

Mark Twain Elementary School

“We see it as our duty to speak as caretakers for the natural world . . . the principle being that all life is equal, including the four-legged and the winged things. This principle has been lost; the two-legged walks about thinking he is supreme with his manmade laws. But there are universal laws of all living things. We come here and we say they too have rights.” (Onondaga Chief Oren Lyons)

I. UNIT BACKGROUND

Chief Lyon’s quote is startling to me and is definitely food for thought. Is it true? Is all life equal? Humans do consider themselves to be supreme on earth. I personally consider myself above an ant, a bird, a bear, or an ape. I guess this thought goes back to the bible for me, to where it states that God created man in his own image. He told them to rule over the earth and subdue it. But he also said that everything that he made was good, so shouldn’t we respect it? Although I don’t totally agree with Chief Lyons, I am empathetic to his cause. We, the two-legged, live our lives as we do because it is comfortable and convenient for us, often with no regard to the universal laws of nature and the consequences that our actions may have on them. I know that I am sometimes guilty of this. How can we change this? Is it even necessary to change our thinking and thereby change our actions? I wonder what the world would be like if more people did think like Chief Lyons. Then I think, “What can one person do?” (an easy out). I wonder how many of my students feel this way. Or do they even think about the environment at all?

Biodiversity refers to all life on earth. It refers to the variety of all species of living things on the planet, from single-celled organisms to complex species such as man. Scientists have identified approximately 1.4 million species so far, but they estimate that many times that amount actually alive on the planet. Scientists put the total number of species somewhere between 10 and 100 million. Man is only one of these species.

Since Europeans first arrived in North America, hundreds of plant and animal species have become extinct. Today more than 950 U.S. species are listed as threatened or endangered under the Endangered Species Act, about 175 are waiting to be listed, and hundreds of others are being studied with some concern. Both the United States and Canada have lost, and continue to lose, vast areas of natural habitat. The United States, for example, has lost more than half of its original wetlands and continues to lose thousands of acres each year. In addition, the country has lost 90 percent of its coastal sage scrub, nearly 80 percent of the prairies are gone, and half a square mile of wilderness disappears every hour. Biodiversity loss in the U.S. and Canada mirrors what

is going on in the rest of the world. According to some estimates, one species disappears from the planet every 20 minutes (World Wildlife Federation). Though extinction is nothing new, this rate of extinction is unprecedented in the history of the planet. No one knows the effects this may have. Do people have a right to eliminate species from the planet? Does it matter what type of species they are? At what point is preventing the destruction of natural wildlife more important than economic development? Who should bear the cost of preserving habitat when doing so stands in the way of development? What obligations, if any, do we have to future generations? What are the main factors that are causing current species losses?

Does biological diversity matter, and where do we draw the line? There are hundreds of useful products – medicine, foods, oils, spices, etc. – that we depend on. Scientists use genetic material to increase growth rates of crops and provide resistance to disease. Biodiversity ensures a healthy ecosystem that purifies water, controls floods, and recycles nutrients. Beauty, recreation, art, and creativity are all byproducts of biodiversity. But the issue is not that simple. At what point do we “lock up” our valuable resources, thereby robbing society of those resources, jobs, and their freedom to develop their own land as they see fit. Also, who is going to pay the cost of setting aside this land? These are all issues that will be explored throughout this unit.

The main focus of this unit is to explore the importance of biodiversity. We are going to look at it from all sides. We will be examining the five main reasons scientists believe we are losing biodiversity: habitat loss, introduced species, pollution (including global warming), population growth, and over-consumption. We will then look deeper into the biodiversity issues themselves. What price are we willing to pay in order to protect biodiversity?

Who are my students?

I am a self-contained fifth grade ESL teacher at a middle- to upper-income school in Houston. About one fifth of my class is ESL. I have Chinese, Korean, Russian, and Saudi Arabian ESL students in my class, but I have many other students who are not ESL, who come from different parts of the world like India, Somalia, Eritrea, and Ecuador. Many of my students' parents are doctors or research scientists. Most of the research is in the field of medicine since our school is located very near Houston's medical center. Almost half of my class has been tested and receives services under the gifted and talented label. I have three children who take medication for attention deficit disorder. Two of my students are in resource. Five of my students are on free or reduced lunch. As you can see, I have a wide variety of needs to attend to, as all classroom teachers do.

Unit specifics

This unit is nine weeks long and is designed for students in fifth grade. There are two overall goals for science which encompass this unit. The first goal is to create informed citizens in regards to the environment who will be able to make decisions and take action. Second, I want to cover as many of the required state and district objectives as possible, both content (soil, plants, animals, water, climate, and energy) and process skills (problem, hypothesis, procedure, variables, data interpretation, drawing conclusions, making inferences and recommendations, graphing, and communicating results). I will accomplish this by using inquiry, cooperative learning, the experimental design process, multiple intelligences, and technology.

I am teaching this environmental unit not to impose my beliefs about nature and the environment on any of my students, but to get them to think about their beliefs. I want to build some background knowledge about the function of living (animals, plants, etc.) and non-living (climate, soil, water, etc.) elements in a habitat and how they are connected. This will help me to teach my state curriculum and will give students a foundation to connect the environmental issues to. The experimental design process will be used to teach the content. Then we will take it a step further by exploring related issues which will give the content a purpose, an enduring quality, and value beyond the classroom. I want them to use their content knowledge to explore both sides of environmental issues, which will allow them to uncover issues and form their own opinions based on scientific data.

II. WHY TEACH THIS UNIT

Is there even cause to be worried about the state of our planet? According to the World Research Institute, the answer to this question is yes. The World Research Institute states:

“In the early 21st century, we are coming to realize that biological resources have limits and that we are exceeding those limits and thereby reducing biodiversity. Each year more people are added to the human population than ever before. Species are becoming extinct at the fastest rate known in geological history, and climate appears to be changing more rapidly than ever. Human activities are progressively eroding the earth’s capacity to support life. The erosion of the planet’s life-supporting systems is likely to continue until human aspirations come more into line with the realities of the earth’s resource capacities and processes, so that activities become sustainable over the long term” (*Biodiversity*).

A couple years ago I really began to notice the trash on our campus. We are an outdoor campus, so whenever you leave one classroom, you are outside. Our “hallways” are sidewalks. It was very disturbing to me to see the trash, especially when I recognized some of the wrappers as coming from treats that I had given the kids. I decided to take a poll of my class to see how my kids would react in different “environmental” scenarios. I

don't remember the exact results of that poll, but I know that I was very disappointed in their responses. One scenario that I gave was for them to imagine that they were at the park playing. They just finished a drink box, and there was no garbage can nearby. If given a choice, would they take the empty drink box home with them to throw it away or leave it on the ground at the park? Most of my students chose to leave it on the ground. This was shocking to me. I had assumed that they had been taught somewhere about the environment and their impact on it. I was wrong. I feel very strongly that we are doing an injustice to our students by not informing them of the effects that they have on the environment. If they don't understand or care about the effects of pollution, then I doubt they know anything about biodiversity, habitat loss, introduced species, population growth, global warming, or over-consumption. Many of them do not realize the consequences that some of their actions may have, so they act innocently without thinking. Whose fault is that? I want my students to be able to make purposeful and informed decisions in regards to the environment.

I believe that there are many reasons for providing students with an ecological education. The greatest benefit that I can think of is that it teaches the students about the environment, their relationship to living creatures, and their surroundings. With this information, students will make informed decisions about their daily actions in regards to the environment. I believe that many of our students do not even realize the impact that they have on their environment. This year I asked my students where their garbage went after the garbage man came and took it away. None of them really knew. I don't think they ever even thought about it. A few of them said, "a dump," but could not explain to me where this dump was and what it looked like. None of my students knew what a landfill was. None of them knew about the decomposition of organic and inorganic matter. Our students cannot make wise choices when it comes to the environment because they do not have the information. Providing students with the time to investigate environmental issues, think about their role in these issues, draw conclusions, and make some conscious decisions is imperative.

I view my fifth grade classroom as a crucial part of moving my students toward a scientifically literate adulthood. The national standards describe a vision of a scientifically literate person as one who can ask, find, or determine answers to questions derived from curiosity about everyday experiences. It means that a person has the ability to describe, explain, and predict natural phenomena. Scientific literacy implies that a person can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. A literate citizen should be able to evaluate the quality of scientific information on the basis of its source and the methods used to generate it. Scientific literacy also implies the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately. This unit is designed to develop scientifically literate thinkers. Students will be describing, explaining, and predicting environmental issues. We will look at national and local decisions and express informed opinions. We will look at sources of information and their potential for biases. We will pose questions and evaluate

arguments based on data. We will be thinkers inside, outside, above, below, through, and beyond the scientific issues we are studying.

Another reason for an ecological education is that I am hoping the students will take some action based on their newfound knowledge. One personal attribute that is stressed at our school is being a responsible citizen. It is one thing to be aware of the concerns about the environment; it is another to do something about them. In order to preserve our environment, citizen participation is a must.

By teaching kids about the earth and its resources, we are instilling values in them. We are teaching them to be appreciative, responsible, and caring problem solvers. We are teaching them about issues that cross all cultural, geographic, and economic boundaries. We are teaching them to look at issues from all sides. We are teaching them to be empathetic to all sides, but to live their lives based on beliefs and values they hold. We are helping to establish in them values that they will carry with them throughout their lives.

Providing an education around ecological issues is a means of showing the connections across cultures. These are global issues that everyone on earth shares. Our students can feel a connectedness with people in Asia, Europe, etc. as we explore these issues. We will compare the United States with other countries, including our offenses and the solutions we have implemented. This will give our students a global perspective, which is especially important after September 11, 2001 because it builds understanding and tolerance toward others for the common good of all.

The final reason to support an ecological education is that there are serious and potentially fatal issues that our students must be aware of in order to preserve life on our planet. Through this unit, students will ask questions, research answers, discuss and explain their findings, judge the validity of information, and express positions that are scientifically and technologically informed. They will do this by exploring some of the issues which threaten our planet and thereby affect the quality of their lives. We will explore issues such as global warming, the introduction of non-native species, pollution, habitat loss, etc. Students will form their own opinions on these issues and decide what should or should not be done. According to Michael Caduto and Joseph Bruchac, “This—our survival or our extinction—could be the ultimate test of the intelligence of today’s society” (Keepers of Life Teacher’s Guide).

III. TEACHING METHODOLOGIES

PYP

Our school is a PYP (Primary Years Programme) school. This means that we have adopted the ISCP’s (International Schools’ Curriculum Project’s) philosophy on developing curriculum. What is an international school? From ISCP’s perspective, it is a

school that, regardless of location, size, or constitutions, strives towards developing an international citizen. What is an international person? It is a person who possesses the following attributes: inquirer, thinker, communicator, risk-taker, knowledgeable, caring, open-minded, well balanced, and reflective. ISCP is committed to inquiry as a vehicle for learning. They define eight concepts (form, function, causation, change, connection, perspective, responsibility, and reflection) that frame the inquiry which drives instruction. (International Baccalaureate Organisation). Keeping this in mind, you will understand why I chose to teach this unit in the manner presented here.

According to Grant Wiggins and Jay McTighe in “Understanding by Design,” there are four filters to use in selecting ideas and processes to teach for understanding. 1. To what extent does the idea, topic, or process represent a “big idea” having enduring value beyond the classroom? 2. To what extent does the idea, topic, or process reside at the heart of the discipline? 3. To what extent does the idea, topic, or process require uncoverage? 4. To what extent does the idea, topic, or process offer potential for engaging students? In designing this unit, I have tried to keep these filters in mind.

District, state, and national policy define required science standards that every teacher must teach. I see the standards as an important knowledge base for students. These are not something that should be merely transmitted to the children; students need to find relevance in them beyond the classroom. They need to be presented in a way that is challenging and engaging. My goal is to teach these standards by using a “big idea” and incorporating inquiry methods which help the kids “uncover” some answers. The “big idea” that will be presented in this unit is: **Human interaction with ecosystems affects the biodiversity on our planet.** We will be inquiring into: **What are earth’s ecosystems? What is biodiversity? What are the causes and effects of human interaction with earth’s ecosystems?** (This question relates to the five issues we will be studying that scientists believe are causing a loss of biodiversity.) **What is our responsibility towards preserving biodiversity?**

Inquiry

I will teach this unit through inquiry. In doing inquiry, teachers are sharing the responsibility of learning with the students. Teachers are there all the time, pushing students and bringing in perspectives that students have not considered. Learning this way becomes a shared responsibility, and the students are never limited by what the teacher knows. Inquiry starts with exploration so that students know something about the topic first in order to ask meaningful questions. This is called “frontloading.”

I will start by finding out what the students already know. Then I will “frontload” the kids by teaching them the concepts needed to help them understand the big picture. Many of these concepts will be district, state, and national guidelines. This will be done by using cooperative learning and multiple intelligences strategies, the experimental design process, and through the use of technology. With this background information,

students will be able to design their own questions about the “big idea” we are studying. By using inquiry to uncover information about relevant and timely ecological issues, students will be engaged and will find enduring quality in the concepts that they are learning.

Cooperative learning

Cooperative learning strategies will be incorporated to teach many of the concepts because I believe cooperative learning has many advantages over the traditional classroom. Cooperative learning promotes higher achievement than competitive and individualistic learning structures across all age levels, subject areas, and almost all tasks. This conclusion is based on a number of major literature reviews, including those of David and Roger Johnson (1981) and Robert Slavin (1983). When we work in small groups, we learn from each other, and this helps foster higher achievement.

A consistent finding in cooperative learning research has been improved ethnic relations among students. According to Kagan and Associates, 1985, improvements in ethnic relations were greater than any other outcome from cooperative learning. Johnson and Associates (1981) and Robert Slavin (1983) found that cooperative learning results in more positive social development and social relations among students at all grade levels. Improving ethnic relations and positive social development is always a part of my “hidden curriculum.” In this unit though, it is not totally hidden. One of my objectives in this unit is to give the students a global perspective on ecological issues so that they can see our connectedness with people around the world. These are global issues that we are dealing with, and it is going to take the efforts of people all across the globe to solve them. Building tolerance for and understanding of people of other cultures is an easy thing to do in my classroom because we are friends of many different cultures. We will bring our different ideas and perspectives into this unit and learn from each other. We will see how complicated these issues can be and try our hand at coming up with some fair, global decisions.

Throughout this unit children will be sitting in cooperative learning groups. They will work in groups to perform experiments, create questions, discuss information, etc. Strategies such as “Think, pair, share,” “Jigsaw,” “Round Robin,” “Carousel,” etc. will be used to introduce new information. This will involve all students in the thinking process versus the traditional raising of hands.

Experimental design process

The experimental design process is the process scientists use to do research. The basic steps are: problem, hypothesis, procedure, variables, conclusion, inferences, and recommendations. Using the experimental design process to teach the content is natural because this is the process by which real science is done in a laboratory setting or out in the field. It is also inquiry based, and is part of the national and state standards that we

are required to teach. When I began really teaching science, this process was a lifesaver to me. I learned that science is a process, and that you don't need to have all the answers. This process gives us a structure, which we can use to find answers. Thus, the teacher is not imparting the "answers" to the student. Students have to find them out for themselves, and the teacher is more of a guide on the side.

When we study fast plants, soil, animals, etc. we will use this process to learn about them.

Multiple intelligences

I also will try to incorporate multiple intelligence strategies based on Howard Gardner's research, which states that not all people learn the same way. Gardner found that there are seven different intelligences (musical, bodily-kinesthetic, logical-mathematical, linguistic, spatial, interpersonal, and intrapersonal) and that children have a biological link to a particular intelligence. Therefore, if we use different strategies for teaching based on the intelligences of the child, this will help them succeed. We also need to stretch all intelligences in all children.

Students will have choices of how to present information that encompass the use of different intelligences. Also, we will do different activities in class which use different intelligences so that all intelligences will be used.

Technology

Technology and the Internet will be incorporated into this unit. I believe this is very important for the future of our students. We are an information-based society, and if students do not have the skills needed to find and use information, they will not be able to play a productive part in our society. According to the Association for Science Education, "Teachers and students without easy access to the Internet and without the skills to exploit its potential are likely to be seriously disadvantaged." In this unit, the teacher will be a guide to help students gather and organize information, judge its value, and decide how to present it to others.

Throughout this unit, students will be learning about biodiversity and the issues that affect it. At this time, they are going to choose an issue in which they are interested and in a cooperative group explore both sides of this issue in-depth. This will be done through a web quest that can be found at my website, <http://www.taxandfinance.com/macdonald/>. When students have finished the web quest, they will present their research to the class. They will have several choices for how they can present (song, art, skit, news report, etc.).

The final activity will be a biodiversity debate. The rules for the debate will also be located on my webpage, and students will need to use technology to prepare for the debate.

IV. THE UNIT

This unit will teach about the ecosystems on earth and the interdependence of everything in them. We will be studying the ecology of the Houston area. It will include both living (plants and animals) and non-living (soil, water, climate, water, and energy) things.

WHAT TO TEACH

Soil

The content we will start with is soil. We will explore its formation, characteristics (likes and differences), function and importance. We will look at decomposition by exploring the compost bin outside our classroom. We will compare characteristics of different soils including texture, capacity to retain water, and ability to support life. We will grow plants in different soils to see which grows best. We will also experiment with erosion using steam tables. We will test to see the role plants have in affecting erosion. We will take a nature walk to observe erosion in our area. We will look at soil in the Houston area and compare it to soil in other places.

The issues that will be woven in here are over-consumption, population growth, and habitat loss.

Plants

After soil, we will study plants by using Wisconsin Fast Plants. We will experiment with these using different amounts of fertilizer and exploring the causes and effects of acid rain. Students will learn about the parts of a plant, the plant life cycle, photosynthesis, respiration, transpiration, the carbon dioxide-oxygen cycle, water cycle, and the nitrogen cycle by studying fast plants. We will study plant life and soil in the Houston area, and the adaptations plants in Houston have that help them survive. Students will compare these adaptations to plants in other ecosystems. We will also look at the effects of bringing in non-native plants to Houston.

The issues that will be woven into this are: introduced species, pollution (global warming and acid rain), population growth, and over-consumption.

Animals

Next we will introduce animals. We will look at habitats and ecosystems. We will study animal behavior – learned vs. inherited, food chains/webs, competition, adaptations, and

life cycles. Students will look at the adaptations that animals in the Houston area have that have helped them to survive, what animals have not survived, and why. They will compare these animal adaptations to animals in other ecosystems. We will do some experiments with different types of insects/animals such as mealworms, pill bugs, and earthworms. Studying earthworms and pill bugs will enable the students to observe the food chain/energy cycle as organic matter is broken down and returned to the soil. We will set up experiments with these insects to compare the decomposition of organic and inorganic matter in soil. We will discuss landfills, and students will watch a teacher-made slide show that explains what they are. Students will also study mealworms in order to review metamorphosis as a life cycle. They will keep a journal as the insects grow and change. They will do some informal testing, make quantitative and qualitative observations, draw conclusions, and make inferences.

The issues that will be related are habitat loss, introduced species, pollution, population growth, and over-consumption. All issues related to the loss of biodiversity will come together here.

Climate

Students will learn about the factors that affect climate in order to be able to predict climate in different areas around the world. We will be looking at climate in order to understand and predict the types of ecosystems that will most likely be in these areas. We will look closely at the water cycle as it relates to climate and acid rain. We will observe the effects of climate on plants, animals, and soil.

The issue that will be incorporated here is pollution (global warming and acid rain).

HOW TO TEACH IT

Somewhere in the room you should have posted the big idea, **Human interaction with ecosystems affects the biodiversity on our planet**, and the inquiry intros, **What are earth's ecosystems? What is biodiversity? What are the causes and effects of human interaction with earth's ecosystems? How do these interactions affect biodiversity? What is our responsibility towards preserving biodiversity?**

You should also have a "Wall of Inquiry" on which participants will post questions that come up as we go through this unit as a class. Students are encouraged to ask questions at all times throughout this unit, and the teacher will model this by thinking of his or her own questions and adding them to the "Wall of Inquiry."

We will ask questions and search for answers. Some of the possible questions that we will explore are: What are ecosystems and how do they work? What are the ecosystems in our area? What effect do we have on them and they on us? Do people have a right to eliminate species from the planet? Does it matter what type of species it is? At what

point is preventing the destruction of natural wildlife more important than economic development? Who should bear the cost of preserving habitat when doing so stands in the way of development? What obligations, if any, do we have to future generations? The questions will be explored throughout the scrapbook, the web quest, and the final debate.

Students will devise their own questions and in this way take some responsibility for their learning. Students will learn how to categorize these questions according to the PYP concepts – form, function, causation, change, connection, perspective, responsibility, and reflection. Students will examine books, plan investigations, use tools to gather information, interpret data, propose explanations and predictions, and communicate their results. I will act as a facilitator, guiding the learning.

Since my students come from many different countries, it will be interesting to see the different experiences and perspectives that they have in relationship to the environment. I know that from my own learning and experience, it seems that Americans in general are not very considerate of their environment. I have a friend who came here from Ecuador. She told me that when she first came here she couldn't believe the habits of many Americans. In Ecuador, workers at restaurants tear napkins in half before they give them to customers. If you want more than half, you have to ask. All resources are very strictly monitored. In schools, there is always a person in charge of photocopies, and you have to ask to get a piece of paper. Cokes are sold in bottles. You cannot leave a restaurant until you finish and leave the bottle. As a class, we can compare the habits of Americans with the habits of other countries by simply having a class discussion since we are from so many different countries. We will talk about how these habits contribute to the issues we are exploring. This may raise more questions for us to consider, or it may give us ideas for actions that we can take.

A classroom library should be set up with many examples of fiction and nonfiction books that are related to the present content you are studying (soil, plants, animals, and climate) and the issues (pollution, global warming, acid rain, over-consumption, population growth, habitat loss, extinction, endangered species, introduced species, and biodiversity). The content books will rotate based on what you are teaching.

In reading/language arts class, the core literature will be *My Side of the Mountain* by Jean Craighead George and *Bridge to Terrabithia* by Katherine Patterson. *My Side of the Mountain* reinforces a lot of the science vocabulary that will be taught throughout this unit. It also shows the importance of nature as a boy struggles to live alone off the land. In *Bridge to Terrabithia*, there is a deep appreciation for nature and a sense of playfulness with it exhibited in the characters. Also, environmental issues such as saving the whales are brought up. We will be reading excerpts from *Disaster!* by George Sullivan. Each chapter in this book tells the story of a different major, environmental, human-caused disaster. In addition to this, students will be reading many nonfiction sources both in print and on the web to do research. We will apply our reading skills such as cause and

effect, fact and opinion, etc. to these readings. We will also look at the PYP attributes – inquirer, thinker, communicator, risk-taker, knowledgeable, caring, open-minded, well balanced, and reflective - to explain which of these our characters exemplify by giving examples from the story. Students will be learning a lot of vocabulary throughout the unit. They will be researching; taking notes; and writing papers, poems, skits, etc. They will summarize and reflect on newspaper articles for their scrapbooks. They will keep journals in which they write both qualitative and quantitative observations.

In social studies, we will explore different countries and their considerations of the environment. We will also look at changes over time in the U.S. and how they have affected the environment from the time of Native American inhabitation, to colonial days, to industrial and present day.

In math we will do quantitative observations in our field studies and experiments. We will also make and interpret graphs.

We will take trips to Braes Bayou, which is near our school. The purpose of these trips will be for students to explore the biodiversity in our area. We will also look for evidence of human interaction with it and what affects this has had. Students will do field studies of the bayou, following a field study data sheet similar to the one in the project WET instruction handbook. Students will observe weather; temperature of air, land and water; dissolved oxygen; phosphates; and pH. They will observe plants; animals; food chains/webs; and land and water uses. They will also look for evidence of habitat loss, introduced species, pollution, population growth, and over-consumption. We will take three trips through the course of the year to observe changes during the different seasons. Students will use pond reference books to help identify the plants and animals they observe.

Throughout this unit, students will keep a *scrapbook* related to the environment and the issues we are exploring. They will be given a rubric, which shows what the expectations are for the scrapbook. This scrapbook can include things such as articles from newspapers, pictures from magazines or the Internet, reflections, quotes, ideas, questions, poems, songs, research, etc. As long as something is related to the environment, it can go in the scrapbook. Students will be expected to write connections in their scrapbook, which should connect the content to the issues. They will also need to show evidence that they have explored both sides of the issues. The PYP values that they uphold in relationship to the environment should be explained and supported. Their opinions on the issues should be clearly stated and supported in their scrapbooks. Students will share pieces of their scrapbook on assigned dates.

Later, students will, in cooperative groups, choose their own issue to investigate while doing a web quest. They may choose habitat loss, introduced species, pollution, population growth, or over-consumption. They will devise their own questions about their topic, categorize them according to PYP, research them, and devise a way to

communicate their findings to the rest of the class. This should include an action component.

As a class we will investigate global warming. We will look at both sides of the issue, and we will have a debate. This will be done as a class so that I can model for the students how to look at both sides of an issue. This will also teach them the rules of a debate and familiarize with the debate rubric. Students will use this rubric to evaluate each other and themselves. This will help to prepare the students for the biodiversity debate at the end of the unit.

Finally, we will look at biodiversity itself. We will have a biodiversity debate. Is biodiversity important enough to protect, and if so, what should be done? We will divide up into teams – pros and cons – by luck of the draw. Rules for the debate are located on my webpage. The purpose of this debate is to get them to really think deeply about the issue, to get them to realize the complexity of the issue, and to continue their own thought process as they explore their values and take a stand.

Students will then design a final page in their scrapbook that illustrates their values (hopefully incorporating the PYP values into this). They must then defend their position on biodiversity using their values and scientific data to support it.

They will also decide what action, if any, we should take to protect the biodiversity on earth. We will devise a plan and carry it out.

I believe that students will be thoroughly engaged in exploring the “big idea,” which is the focus of this unit, while learning the district, state, and national standards as a byproduct. In this way, students will be constructing their own meaning and taking ownership of their learning. Students will be able to relate the experiences of the classroom to the realities of the outside world. They will be inquirers, thinkers, communicators, risk-takers, knowledgeable, principled, caring, open-minded, well balanced and reflective. These are the desired attributes of an internationally minded person according to PYP.

V. LESSON PLANS

Lesson 1

Objective: Assess prior knowledge and attitudes about biodiversity.

Materials: Seven pieces of chart paper, seven different colored markers, tape, a copy of the “Polar Opposites Environmental Attitude Survey” for each student (See below), and a transparency of the attitude survey

Teacher Preparation: On each piece of chart paper write one of the following words; Biodiversity, Habitat Destruction, Global Warming, Introduced Species, Population Growth, Over-Consumption, Ecosystems. Tape these up around the room with space in between so that they are equally spaced going all around the room. Number them one through seven.

Activity 1 (Carousel Activity): Exploring Biodiversity Knowledge Pre-Assessment

Tell the students that you are going to be beginning a new unit today that will last for the next nine weeks. The unit is called 'Exploring Biodiversity.' Explain to them that, before you begin the unit, you want to assess what they know and how they feel about biodiversity. You will start this by doing a brainstorming activity called "carousel," in which the students, in cooperative groups, will write down everything they know about certain words. Before you do this, though, you want to make sure that they understand how to brainstorm.

1. Put up the name of your school, "Mark Twain Elementary." Also, write the words, "who, what, where, when, why, how."
2. Ask them to write down everything that they know about their school in their groups. Tell them that they may want to remember the question words to help them.
3. Share. You should have answers related to who, what, where, when, why, how. Basically anything that relates to Mark Twain in any way is acceptable.
4. Next, explain that they are going to do a carousel activity in which they will brainstorm with their groups everything that they know about the words written around the room. They will record their answers on the appropriate chart paper in the colored marker that their group has been assigned. Group 1 will start at chart paper 1, group 2 at 2, etc. (I have seven groups in my room so this will work conveniently for me. You may need to adjust your groups.) Tell them that they will have about 90 seconds at each station, and that when you say, "rotate," their group needs to move to the next station. If you are in station 7, you will move to station 1. You will continue this until each group has been around the room one time. As they move on, it may get harder, because they cannot repeat something that has already been written.
5. Answer any questions before you begin.
6. Begin carousel activity.
7. Review charts as a class. Ask, "Is there anything written that you don't agree with? Is there anything written that surprises you? Is there anything written that you have questions about?"

Activity 2: Exploring Biodiversity Attitude Pre-Assessment

1. Put up the transparency of "Polar Opposites Environmental Attitude Survey," but take out the word, "Environmental" and put in the word, "School." Take the attitude survey about school with the whole class to make sure they understand how to fill it out, and what all the adjectives mean.

2. Give each student a copy of the Polar Opposites Environmental Attitude Survey and ask them to fill it out honestly. Tell them that this will not be a grade. I suggest having them fill this out in pen so that it cannot be erased. Explain that they will be filling this out again at the end of the unit to see if this unit has changed their attitudes about the environment.

Polar Opposites Environmental Attitude Survey

Where do you think that **YOUR thoughts and concerns about the environment** fit in on this PYP PROFILES chart and *why* do you think that?

- | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|---------------|
| 1. UNINTERESTED | ___ | ___ | ___ | ___ | ___ | INQUIRER |
| 2. SILENT | ___ | ___ | ___ | ___ | ___ | COMMUNICATOR |
| 4. COWARD | ___ | ___ | ___ | ___ | ___ | RISK-TAKER |
| 5. UNINFORMED | ___ | ___ | ___ | ___ | ___ | KNOWLEDGEABLE |
| 6. UNPRINCIPLED | ___ | ___ | ___ | ___ | ___ | PRINCIPLED |
| 7. INSENSITIVE | ___ | ___ | ___ | ___ | ___ | CARING |

Lesson 2

Objective: How to recognize an environmental article. What is an issue (controversy)?

Materials: copies of newspapers, magazines and Internet articles – some related to the environment and some not, a copy of the website list to find environmental articles for each student

You can ask students to bring in newspapers and magazines from home that they are not using. For best results, a note should be sent to parents a week before this lesson asking for these over the next seven weeks since you will be using them over the course of this unit. You can make copies of the articles if needed because all groups will need many articles to look at.

Teacher Preparation: Make a t-chart. Put title of articles that deal with the environment on one side and titles that don't on the other. Label the columns A and B. Make a transparency of this.

Example:

A

B

Boeing lays off 860 Workers	No Sign of Monkey pox Found at Site
Should I Get Homeowner's Insurance?	Tama Landfill Nixes Yard Waste Fee
Agassi Coming to Grips	Neighbors at Odds on How to Handle Runoff
Democrats Target Bush	Power Outage Disrupts Traffic Near Crossroads
Festivals Fill Summer Evenings With Music	State Park's Size Will Double Thanks to DNR

1. Put up t-chart with article titles. Ask kids what the titles for the columns of the t-chart should be. Give them some time to think about it and discuss in small groups.
2. Tell students that if they need an article read to them, you will read it.
3. If they are having trouble, tell them to focus on column B. What do all these articles have in common? If they can figure out column B, A is the opposite.
4. Once they figure it out, ask the question, "How do you know if an article is an environmental article?" If you had to explain it to a 3rd grader, what criteria would you give them to help them decide if it is an environmental article? Record some suggestions on the board.
5. Tell students that they need to make a list of criteria that could be used to decide if an article is an environmental article. They are developing a rubric. Once finished, they need to use the rubric to organize a pile of articles as environmental or not.
6. Groups share criteria or rubrics and their use.
7. As groups share, use the information to develop a class criteria list or rubric that students can use to help them choose appropriate articles.
8. Tell students that they can include any environmental articles that they find in their scrapbook, but you are especially looking for environmental issues. You may want to add this to the bottom of the criteria list. Ask, "What is an issue?" (An issue has controversy. There are at least two opposing sides to it) "How do you know if the article is an issue?" Have students think of issues in their lives with their families. Share. (bedtimes, homework time, etc.)
9. Look at list above (t-chart). In the B column can you tell if any of these articles are issues? (Neighbor's at Odds on How to Handle Runoff). Is it possible that any of these other articles are issues? Which ones could be an issue? Which ones are you probably sure are not issues?
10. Students need to look through articles and find one that is an issue. If they cannot find one in class, they will need to get one for their homework.
11. Ask, "Where can you find articles? Newspapers, magazines, Internet. Give them a list of Internet sites that they can go to. Also, show them some of these sites on the computer. While on sites, show them how to navigate and become a subscriber if needed. Also, look at headings and discuss if they might be appropriate articles and/or if they are issues.

<<http://abcnews.go.com/index.html>>.

ABC News

<<http://www.cnn.com/>>.

CNN

<<http://www.enn.com/news/>>.

Environmental News Network

<<http://www.eurekalert.org/>>.

Eurekalert News by Subject

<<http://www.aip.org/isns/>>.

Inside Science New Service

<<http://www.latimes.com/news/science/>>.

Las Angeles Times Science and Environmental News

<<http://www.science.org.au/nova/>>.

NOVA: Science in the News

Lesson 3

Objective: How to record an environmental article review

Material: a copy of the “Knowledge Chart” from *The Art of Inquiry* by Nancy Lee Cecil for each student, a local (if possible) environmental article for the teacher to read aloud, a second environmental article copied for each student.

This chart is intended to be used before and after reading or listening to a selection containing factual information.

Whole Class:

1. Put up overhead of the knowledge chart (or you can draw one on the chalkboard). Give all students a copy of the chart to fill in as you go.
2. Choose an environmental article that you have found recently.
3. Ask the kids what they know about that topic and record answers in the knowledge box on the chart.
4. Ask the students what questions they have about the topic. You may want to give them a minute wait time to think and record questions. Then, in small groups they can go around and share their questions one at a time. Next, call on students to share some questions. (This is a cooperative group strategy called “round robin.” It gets all the kids involved and thinking about the topic. Record the questions in the questions box on the chart.

5. Tell the students that you are going to read an article on this topic. Direct them to listen for answers to their questions and think about new questions that may arise.
6. Read article.
7. Revisit chart to see if original knowledge was changed. Check to see if questions were answered. Students can do this in cooperative groups. Teacher can then randomly call on students to share since they will have already collaborated with their peers.
8. Add new knowledge to the chart. You may have students do this using the “round robin” strategy in small groups first. Share as a class and fill in charts.
9. Next, students add any new questions they have that they may want to research, or old questions that were not answered that they are still interested in. Call on volunteers to share ideas with the class. Record answers on the chart. If some of the questions seem to keep popping up, you may want to have kids record them on sentence strips and add them to your “Wall of Inquiry.”
10. Finally, students record how they think or feel now about this topic. Call on students to share ideas with the class.

After you have modeled the article review, make your expectations clear. Give students a copy of the “Environmental Article Review Rubric.” Not only do students need to know what the expectations of the article summary are, but also, how many are required. This is stated in the “Scrapbook Rubric.” Students should have copies of both of these.

Small Group:

Using the “Knowledge Chart” and rubric, have students review a copy of a different environmental article given to them by the teacher. This should be done in cooperative groups and follow the same process above.

Individual:

Homework: Students need to find their first copy of an environmental issue and summarize it using the “Knowledge Chart” below.

Name _____ Article Date _____
 Article Source: _____

Article Title _____

<i>Answer before reading</i>		<i>Answer after reading</i>		
Knowledge	Questions	New Knowledge	Research	Reactions
What do you know about this topic?	What do you want to know about this topic?	What did you discover after reading the article?	What do you still want to know about this topic?	How do you now think or feel about this topic and why?

Adapted from “The Art of Inquiry” by Nancy Cecil

Mark Twain Elementary
Knowledge Chart: Environmental Articles



Name: _____

Teacher: _____

Date : _____

Title of Work: _____

	Criteria				Points
	1	2	3	4	
Student clearly explains previous knowledge on the article topic.	1 related comment, not very well explained.	At least one clear, well explained idea.	At least 2 well explained and clearly written ideas. (Capitalization, punctuation and spelling are considered.)	A few (>2), well explained and clearly written ideas. (Capitalization, punctuation and spelling are considered.)	_____
Student lists appropriate and thoughtful questions about the article topic.	1 related question	2-3 related questions	3 related and thoughtful questions with many mistakes in spelling, punctuation or capitalization.	At least 3 related questions with few mistakes in spelling, punctuation or capitalization.	_____
Student demonstrates a clear understanding of important information in article.	The main idea is stated with some detail.	Most of the important details are included in a clear and concise manner.	All important details are included in a clear and concise matter. Mistakes in capitalization, punctuation and spelling are common.	All important details are included in a clear and concise matter. Few, if any, mistakes in capitalization, punctuation and spelling.	_____
Students list appropriate questions for further research. (These questions should not have been answered in the article.)	1 appropriate question	2-3 appropriate questions	3 appropriate and thoughtful questions with many mistakes in spelling, punctuation or capitalization.	At least 3 appropriate and thoughtful questions with few mistakes in spelling, punctuation or capitalization.	_____
Student records their current feeling about this topic and why.	Student tells how they feel with no explanation.	Student tells how they feel with a small explanation.	Student gives clear and detailed explanation with clear explanation. Writing has many spelling, punctuation, or capitalization errors.	Student gives clear and detailed explanation with clear explanation. Writing has few spelling, punctuation, or capitalization errors.	_____
				Total---->	_____

Teacher Comments:

Lesson 4

Objective: Explain and set up Biodiversity Scrapbook

Materials: All students are going to need a folder with brads or three-ring binder; 10 pieces of loose leaf paper for each student; a couple of copies of the knowledge chart used to review environmental articles for each student; a transparency of Biodiversity Scrapbook Rubric (see below); a copy of the scrapbook rubric for each student; a copy of the rubric for scrapbook presentation for each student; examples of poems, quotes, songs, etc. related to the environment; and a copy of an environmental poem for each child.

1. Go over the rubric with students. They should already be familiar with the article criteria.
2. Practice writing connections and reflections with the students. Put up a transparency of a poem.

Harm No Living Thing

harm no living thing.
let your hand harm no living thing.
tread not on the busy ant or things that crawl or creep.
cause no mischief to those that fly.
leave in peace watery creatures.
renew your spirit, soul and energy, from provided plants
that cure and heal.
forbid your mind from searching greed.
for only more is enough.

by Mick Leigh

3. Have kids share a *connection* going around in small groups. This would be something in their life that they are reminded of when they hear this poem. Ask for some volunteers to share out loud. Now have kids write their connection in detail.
4. Next, have them reflect on the poem. How did it make you feel? Do you agree with the author? Why or why not? If the author knew about you and how you treat living things, what would he think about you? Why? Does this poem relate to Houston, Texas in any way? Why or why not? Who in Houston could benefit most from hearing this poem? Why? Discuss the poem out loud and write comments for everyone to see. Have students write their *reflections*. They can use thoughts from the class discussion if that is how they feel.
5. Finally, have students share and then record any *questions* on their mind after reading the poem.
6. Now, use the rubric to evaluate this sample.

Mark Twain Elementary
Biodiversity Scrapbook



Name: _____

Teacher: _____

Date : _____

Title of Work: _____

	Criteria				Points
	1	2	3	4	
A variety of Environmental articles and summaries were provided.	5-8 articles and summaries were displayed, a variety of environmental issues were covered, some articles had controversy	9-11 articles were displayed, a variety of environmental issues were covered, some articles had controversy	12-14 articles and summaries were displayed, a variety of environmental issues were covered, some articles had controversy	>14 articles and summaries, a variety of environmental issues were covered, some articles had controversy	_____
Connections and reflections related to the science content, Houston, Texas, and themselves with the environment	Student shows a few connections and reflections with some thought and detail.	Student shows many connections and reflections with some detail and thought about their relationship to the environment.	Student shows most types of connections with clear, detailed and insightful reflections of their actions in relationship to the environment.	Student shows all types of connections with clear, detailed and insightful reflections of the causes and effects of their actions on the environment.	_____
Student's questions, values, and thinking were evident.	4-6 thoughtful questions with some evidence of student's thoughts and values as related to the questions	7-9 thoughtful questions with some evidence of student's thoughts and values as related to the questions	10-12 insightful questions with some evidence of student's thoughts and values as related to the questions	>12 insightful questions with some evidence of student's thoughts and values as related to the questions	_____
Other: pictures, quotes, ideas, poems, songs, etc. related to the environment	Little effort or evidence of this.	A variety of examples.	Many varied and diverse examples of this with some of the student's thoughts	Many varied and diverse examples of this with clear and detailed thoughts from the student	_____
Neatness, legibility (spelling, punctuation, grammar), creativity and a WOW factor	More effort needed. Somewhat neat, fairly legible, with little creativity.	Good effort. Neat, legible, and creative.	Great effort! Very neat, legible, and creative.	Awesome effort! Very neat, legible, and creative Also has something that makes the reader say, "WOW"!	_____
				Total---->	_____

Teacher Comments:

7. Answer any questions students have about the rubric. Tell students that they can write their own poems. The quotes can be famous, or they can just be from a

neighbor or a friend. For example, if you are outside and your neighbor says, “I am sick of these squirrels, I am going to set some traps to get rid of them.” This would be a quote you could write down. Hopefully if you hear your neighbor say that, you might have some questions for him or her, like, “What will you do with them once you catch them?” This could all be recorded. Ask students for ideas of things they could put in their scrapbook. Make a list of these ideas. This list might also be used as a reference.

8. Collect all students’ connections and reflections to assess and give feedback so they know if they are on the right track. This will later go in the front of their scrapbook as an example to consult.
9. Inform students that they will be choosing one or two items from their scrapbooks and presenting them periodically. Give them a schedule of when they will present. Show them a copy of the rubric for presenting (see below). Go over this with them and answer any questions they have.

Mark Twain Elementary
Biodiversity Scrapbook Presentation



Name: _____

Teacher: _____

Date Submitted: _____

Title of Work: _____

	Criteria				Points
	4	3	2	1	
Body Language	Movements seemed fluid and helped the audience visualize.	Made movements or gestures that enhanced articulation.	Very little movement or descriptive gestures.	No movement or descriptive gestures.	___
Eye Contact	Holds attention of entire audience with the use of direct eye contact.	Consistent use of direct eye contact with audience.	Displayed minimal eye contact with audience.	No eye contact with audience.	___
Introduction and Closure	Student delivers open and closing remarks that capture the attention of the audience and set the mood.	Student displays clear introductory or closing remarks.	Student clearly uses either an introductory or closing remark, but not both.	Student does not display clear introductory or closing remarks.	___
Pacing	Good use of drama and student meets apportioned time interval.	Delivery is patterned, but does not meet apportioned time interval.	Delivery is in bursts and does not meet apportioned time interval.	Delivery is either too quick or too slow to meet apportioned time interval.	___
Poise	Student displays relaxed, self-confident nature about self, with no mistakes.	Makes minor mistakes, but quickly recovers from them; displays little or no tension.	Displays mild tension; has trouble recovering from mistakes.	Tension and nervousness is obvious; has trouble recovering from mistakes.	___
Voice	Use of fluid speech and inflection maintains the interest of the audience.	Satisfactory use of inflection, but does not consistently use fluid speech.	Displays some level of inflection throughout delivery.	Consistently uses a monotone voice.	___
				Total---->	___

Teacher Comments:

10. Students set up scrapbook. At the front, they should have: polar opposites attitudes survey, criteria chart for environmental articles, website list to find

environmental articles, copy of student's first article review using the knowledge chart with teacher feedback, copy of poem with student connections, reflections, questions, and teacher feedback, copy of scrapbook rubric, scrapbook presentation schedule, copy of scrapbook rubric for presentation, list of scrapbook ideas, signed parent consent note which informs them of the unit and its requirements. A divider should come after these pages so that students realize these pages are not part of the graded scrapbook. These pages are for them to reference if they have questions. After the divider students should have their 10 pieces of loose-leaf paper. They will need to add more as needed. They should also have two copies of the knowledge chart for reviewing articles. Tell them that this will get them started, but that they are going to need more copies. You should have a place in the room where they can get these copies when needed. Students should make a cover for their scrapbook.

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In this book Gardner explains in detail his theory of multiple intelligences and how it applies to the classroom.

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This article outlines three educational processes for which the Internet is useful. It also gives some useful websites for science teachers.

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This book provides research supporting cooperative learning and explains many specific types of cooperative learning strategies that can be used in the classroom.

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Ohio State University. *Activities for the Changing Earth Systems*. Columbus: Earth Systems Education Program, 1993.

This guide is intended to fill the need for global-change teaching material. Its activities incorporate art, music, and literature as well as a focus on stewardship of natural resources. Global change activity topics include; biodiversity, the greenhouse effect, deforestation, climate modeling, and more.

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This publication gives facts about the effects of fertilizers and teaches how to compost.

Texas Natural Resource Conservation Commission. *WET: Instruction Handbook*. Texas: TNRCC, 1990.

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This video introduces how human activities are endangering thousands of species and why it is important to protect them. It describes the Endangered Species Act, its successes and criticisms.

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There is a chapter in this book devoted to ecology. It has a few good ideas and some good diagrams of ecosystems, food webs, and the water cycle.

VanCleave, Janice. *Earth Science For Every Kid*. New York: John Wiley and Sons, 1991.

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VanCleave, Janice. *Ecology for Every Kid*. New York: John Wiley and Sons, 1996.

This book has a lot of simple, cheap activities for teaching the content in this unit.

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This book explains ways that teachers can design courses and units to emphasize understanding and “uncoverage” rather than “coverage.”

Williams, Paul. *Wisconsin Fast Plants Growing Instructions*. North Carolina: Carolina Biological Supply Co, 1989.

This book describes Wisconsin Fast Plants and how to grow them.

Wilson, E.O. *Biodiversity*. Washington, DC: National Academy Press, 1988.

This book is a great resource for teachers. It discusses the challenges to preserve biodiversity, human dependence on it, the risks, its value, how it is monitored and protected, etc. It contains 500 pages of small print and a lot of interesting facts.

World Research Institute. *Biodiversity*. June 2003. <<http://www.wri.org/wri/biodiv/cwb-i.html>>.

This article explains what biodiversity is and why it is important.

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This is a video and teacher's guide designed to introduce students to the topic of endangered species. It emphasizes loss of habitat as a serious problem endangered species face. It also discusses how wild species are in competition with humans for food, water, and shelter. The teacher's guide gives many ideas for activities to accompany the video.

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This is a slide show with an accompanying audiocassette and an interactive CD-ROM. It is approximately 20 minutes. This slide show presents a lot of information that can form the foundation of an interesting discussion of biodiversity conservation issues.

World Wildlife Fund. *Windows on the Wild*. Washington, DC: WWF, 2001.

This is a curriculum unit and slide show which addresses wildlife sales through commercial products and its effect on biodiversity.

Student Books

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This is a great resource to have in the room. It includes information on the distribution, habitat, biology, and management of endangered or threatened animals in Texas. It also has great photos.

Craighead George, Jean. *My Side of the Mountain*. New York: Penguin Group, 2001.

This is a story about a boy who runs away to a forest and lives off the land.

Environmental Action Coalition. *It's Your Environment: Things to Think About- Things to Do*. New York: Charles Scribner's Sons, 1976.

The text, illustrations and suggested projects explore environmental concerns of urban areas. It explains how we use energy, where garbage goes, packaging, recycling, birds in the city, butterfly seasons, etc. with simple kid friendly text and drawings. For each topic discussed, it gives suggestions for actions or projects to help.

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This book explains the process of extinction, both natural and human induced and the reasons why species become endangered.

Lord, John. *The Greenhouse Effect and Global Warming*. Santa Monica: Enterprise for Education, 1991.

This 15-page magazine explains global warming, its possible effects on earth, and what we can do.

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Pollock, Steve. *Atlas of Endangered Animals*. New York: Facts on File, 1995.

This explores the threats to animal life around the globe, region by region. It contains color photos and maps.

Pollock, Steve. *Ecology: Eyewitness Books*. London: Dorling Kindersley, 1993.

This publication has great pictures and lots of information. It describes ecology, energy, food webs, carbon cycle, niches, population growth, biomes, diversity and human impact. It is kid friendly.

Porrirt, Jonathon. *Save the Earth*. Kansas City: Turner Publishing, 1991.

This book is full of photos and environmental quotes from distinguished people around the world. It has chapters devoted to rainforests, croplands, biodiversity, mountains, global warming, water, wetlands, population growth, etc. This is a great resource book, but also a book that the kids might get something out of.

- Pringle, Laurence. *Living Treasure: Saving Earth's Threatened Biodiversity*. Washington, DC: Earth Foundation, 1994.
This explains how our planet came to have an abundant variety of life forms and why even little-known species have value. It looks at the threats to biodiversity and ways individuals can help.
- Seuss, Dr. *The Lorax*. New York: Random House, 1971.
This picture book tells the story of how all the Truffula Trees were cut down to make consumer goods and the effect that had on the environment.
- Siebert, Patricia. *Toad Overload*. Connecticut: The Millbrook Press, 1996.
This is a true story about nature being knocked off balance in Australia by the introduction of a non-native species of toad.
- Sullivan, George. *Disaster! The Destruction of our Planet*. New York: Scholastic, 1992.
In this publication each chapter tells the story of a disaster in nature caused by humans. Some of the stories told are: Death at Donora, Vanishing Wildlife, Tragedy in Alaska, Chernobyl Meltdown, and The Poison Cloud. Each chapter takes five to 10 minutes to read and paints a moving and horrifying picture of true stories in which humans have caused disasters in nature, which have taken many lives. I plan to read chapters of this book out loud to my students so that they can realize the effects of some human interaction with nature. This publication is out of print.
- Taylor, Dave. *The Endangered Animals Series*. New York: Crabtree, 1992.
The series includes books on endangered animals of grasslands, forests, wetlands, mountains, islands, oceans, deserts, and savannahs.
- Tharp, Barbara, Judith Dresden and Nancy Moreno. *Mystery of the Muddled Marsh*. Houston: Baylor College of Medicine, 1997.
This is a storybook about some animals whose habitat is being destroyed by runoff from pesticides and fertilizers.
- The Earth Works Group. *50 Simple Things You Can Do to Save the Earth*. Berkeley: The EarthWorks Group, 1989.
This book offers a lot of suggestions to help the environment, from which kids may get ideas when it comes to the action component.
- Wright, Alexandria. *Will We Miss Them?* New York: Charlesbridge, 1991.
Written by an 11-year-old, this book highlights information about several endangered species.

