



## **Humans: Champions of Justice or Villains of the Ecosystem?**

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### **Introduction**

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A passage from Wangari Maathai's memoir, *Unbowed*, although simple, made me aware of the interconnectivity of us all. She talks of being a young girl playing outside her rural Kenyan home. She marvels at the beauty of frog's eggs she found under the arrowroot trees. Not knowing exactly what they were, she would attempt to catch them and make a necklace out of the slippery pearls. At other times, she would try to catch tadpoles which wriggled from her hands as she dipped them in the water. Later, she would see frogs hopping throughout her small area of play but would not until her adult life know that all various stages were representative of the same creature. As she went on to school, she learned about the frog's life cycle but without the proper access to this knowledge, she would not have realized the importance of our interrelatedness. <sup>1</sup> Although the human race prides itself on its superiority, we must recognize the delicate balance which exists amongst all living things. My responsibility is to guide my students to this importance and equip them with the knowledge and desire to continue to maintain the balance of the ecosystems of which we all belong.

My desire as an educator is to guide my students through roads of information so they may be able to make informed decisions for themselves. My goal is to develop a unit based on self-discovery and scientific knowledge, and to create young problem-solvers to help ensure that we have future citizens who will work diligently to undo the damage humans have exacted on our planet.

As a fifth grade teacher, I am responsible for teaching ecology for one-quarter of the school year. Over the years of teaching ecosystems, I have developed a personal interest in this particular subject, and I find it fascinating to learn about the various environments which exist around the world and the way in which nature has been able to live harmoniously since the beginning of time. Before industrialization, plants and animals have been able to survive, adapt, and co-exist in nature for over millions of years. Today, many decisions made in the name of modernization and growth has engendered various detrimental impacts on our earth.

Polar ice caps are melting, various species of animals are endangered or have become extinct, and pollution and use of chemicals are affecting the health of people as well as animals, by way of water, land, and air. The most frightening aspect is that as a teacher and a parent, I feel that my fellow adults and I have a moral responsibility to pass on a world in which our youth can take charge of and continue to lead us into the future. However, the way in which we are treating our earth may result in passing on to our children a broken legacy,

not fit for any living creature.

My strongest desire is to inform our students about the environmental dilemmas that exist in our world in the hopes that they will be able to devise solutions and to determine ways to improve and maintain sustainability. I intend to make activists of my students as well as myself by making at least one contribution to benefit the world. Since this journey will unearth some very disturbing facts about our environment, I do not want to leave them disheartened, but instill in them courage and hope by showing them examples of other students and children who have made a difference in the world, such as the Fagervik children of Sweden who coordinated a world-wide effort to raise millions of dollars for a Costa Rican rainforest. <sup>2</sup> In turn, these real-life examples will assist in inspiring my students to dream up their own contributions to preserve our environment.

## Rationale

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I want to achieve an awareness of the world around my students by creating a cohesive unit that explores the characteristics of various commonly found ecosystems and have students research and observe various environments in which these interactions amongst living and non-living organisms take place. Oftentimes, my fifth graders come to me oblivious of the idea that we are all crucial parts of the ecosystems in which we live. All humans should understand the delicate balance that exists in all ecosystems. I feel that my students should leave my class aware of how organisms live together and maintain this balance in order to sustain life for all creatures. It is so amazing to see how these plants and animals can survive and maintain themselves when equipped with the tools needed for survival: food sources, clean water, safe habitat, and the ability to adapt to those changing effects in their surroundings.

On the flip side, we should learn that our interruptions to the natural order of many ecosystems are not always helpful to all. We need to be aware of how our purposeful and accidental influences change these ecosystems and in turn, negatively shapes our own future health and well-being as a result of this carelessness and neglect.

## Objectives

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As a fifth grade elementary teacher of the North Carolina Essential Science Standards, I am required to teach the structures and functions of living organisms under the broad umbrella of life science. I must guide my students to understand the interdependence of plants and animals within their own unique ecosystems. They must also be able to compare several common ecosystems, classify organisms into terms such as producers and consumers, while being able to disseminate the effects that these relationships may bring to their ecosystem. This includes the role in which humans play in this interaction.

I will present a model to the class using the rainforest ecosystem. During the instruction of this ecosystem, I will discuss the various parts of the biome such as the biotic and abiotic factors, the climate, landforms, geographical locations around the world, and include various facts about the rainforest. Once they are well-versed on the biome, I will then begin to discuss the human impact.

I will pose the initial question, champions or villains, and present to them six cases of human interaction with the African and Amazon Rainforest ecosystems. Although my students will be unaware, some will be positive examples and some will be negative examples of human impact. They will be provided with images, read articles about the environment's current state, watch movies and commercials, as well as read a variety of fiction and non-fiction texts in order to make informed arguments about ways that future citizens can preserve our environment. Once they have gathered all of this information, the students will meet in cooperative learning teams to make a conclusion on whether humans are more harmful or more helpful to the environment. After they reach their conclusions, they will do a brief presentation of their findings with proof to substantiate their claims.

After we have discussed and debated as a class, the students will be presented with the remaining biomes and major ecosystems: desert, tundra, taiga or coniferous forests, the grasslands (savanna), deciduous or temperate forests, the ocean, freshwater ecosystems, estuaries and coral reefs. They will work with teams based on a common interest and begin their research on the particular ecosystems they choose to study. They will be responsible for finding information on the characteristics of each ecosystem or biome; its climate, plants and animals, landforms, and any challenges it faces today. The students will create a solution for a specific problem that their adopted ecosystem is experiencing. I will act as facilitator, by assisting the learning teams with resources, contacts, and possible fundraising activities to help make their solution a reality. As a culminating activity, we will present this information to other classes and grades and provide them with ways they can get involved in the efforts to improve our environment.

My hope is that these projects can be adopted by our school, getting public attention to help spread the positive changes throughout our world. My wish is that my students will change in a positive way during this process, instilling life-long learning despite one's age and embracing their role as the future guardians of our world. I want to create leaders in my students with courage to implement change, no matter how small.

## Background

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In order to teach this unit, there is some basic earth science knowledge students need to know. The first essential term is **ecosystem**. An ecosystem is the interaction of biotic and abiotic organisms in an environment. This includes **biotic** or living factors such as plants, animals, and humans. An ecosystem also includes **abiotic**, or non-living factors such as sunlight, minerals, water, rocks, and soil. There are six major ecosystems which are located throughout the world that share common climate, location, organisms, and landforms, called biomes. These biomes, which are studied in fifth grade, are called the tropical rainforest, tundra, desert, taiga or coniferous forest, grasslands, temperate forest or deciduous forest.

Tropical Rainforest is a biome located near the Equator, which receives the most precipitation, or rain than all other biomes. There is also a presence of the greatest variety of plant and animal species in the world, also known as the term biodiversity. The rainforest consists of four layers: the canopy, the emergent layer, the understory and the forest floor. The climate is hot and humid all year long. This biome receives the highest amount of precipitation each year. It is difficult for plants to grow on the forest floor due to a lack of sunlight which is blocked by the lush canopy of trees in this forest. <sup>3</sup>

Tundra or Boreal Forest is a biome located in the arctic regions of the Earth. This biome consists of two layers

of soil: a top soil, where plants with shallow roots can grow, and a permanent layer of ice called permafrost. Permafrost, until recently, stays frozen all year long and is one of the main reasons why plants with long roots, such as trees, cannot survive in the tundra. The tundra also contains small shrubs and short grasses which the animals can graze on during the summer months. The animals living in the tundra often use their fur as camouflage in the winter as protection from predators. The climate is extremely cold and there seems to be only two true seasons in the tundra: winter and spring. A strange but interesting fact is that the tundra is home to many mosquitoes.

Desert is a biome located at the lower latitudes on the continents of North America, South America, Europe, Antarctica, Africa and Asia. There are four types of deserts: arid, semi-arid, coastal, and cold. <sup>4</sup> The desert receives the least amount precipitation each year of all the various biomes, at an annual average rainfall of 3 to 5 inches. Its climate normally consists of extremely hot days and cool nights, which most people don't know. The plants tend to have deep, long roots in order to find water systems far below the surface. Many of the animals are nocturnal (active at night) in order to stay cool and safe during the scorching daytime temperatures.

Taiga or the Coniferous Forest is a biome located on the continents of North America, Europe, and Asia. This biome has short, warm summers and long, cold winters. The total annual precipitation is approximately 10-30 inches. The plant life mainly consists of conifer trees (trees with cones) such as pine, evergreen, fir and ash. It is also possible to have deciduous trees present in this biome. Although there is not a very large range of biodiversity, animals do live here. The animals which live in the Taiga usually have fur which turns white to camouflage their bodies during snowy winter days. <sup>5</sup>

Grasslands are a biome located in North America, South America, Asia, Africa, and Europe. <sup>6</sup> Grasses and few trees are the dominant plant life in this biome. These areas are usually places where farmland is found and serves as excellent grazing for animals. One may find grazing animals, birds, reptiles, and insects. The grasslands have different names depending on where they are located in the world. In Africa, they are named savannahs, steppes, pampas, veldts and prairies. The average annual precipitation they receive is approximately 20-35 inches.

Deciduous Forest or Temperate Forest is a forest which contains a variety of trees. They can be found in the United States, Canada, Europe and Asia. "Deciduous" simply means that the leaves fall off of the trees, normally occurring in the autumn season. There are four definitive seasons in this biome: winter, spring, summer and fall. Summers are generally mild, with the winter temperatures falling below zero. Animals found in this biome are black bears, foxes, squirrels and rabbits. Types of trees native to this area are elms, maples, and birch. The average annual precipitation is approximately 30-60 inches.

Freshwater Ecosystems-this includes lakes, streams, rivers and ponds. Rivers and streams begin in mountains and flow downhill. Ponds and lakes are surrounded by land. Plants native to these ecosystems are cattails, algae, and lily pads. Animals found in freshwater are fish such as trout, birds, frogs, and insects. Freshwater ecosystems are very important because this water is important to human survival, as we use it in our homes.

Saltwater Ecosystems-this ecosystem is also commonly known as the ocean. There are three basic zones in the ocean: euphotic, disphotic, and aphotic. The euphotic zone is the top layer of the ocean where the most sunlight penetrates. Photosynthetic plants are able to survive at this level. The disphotic zone is the located in the middle of the ocean. Animals such as whales, lobsters, crabs, and squids make their homes here. Plants are unable to survive in this zone due to the amount of sunlight required for photosynthesis to occur. The

aphotic zone consists of the deepest levels of the ocean, where there is virtually no light. The fish residing in this zone are oftentimes blind or are bioluminescent, which means they can create their own form of light such as the angler fish.

Estuary-this is the location where freshwater meets with saltwater bodies. This area is also known to contain brackish water. This ecosystem is home to wildlife and plants which are able to reside in both fresh and saltwater environments. Many types of birds are found in this ecosystem, as well as fish, shellfish, alligators, and crocodiles. <sup>7</sup>

**Coral Reef** is an ecosystem usually found in clear, tropical oceans. They are not extremely deep in the ocean, as they need the sunlight to survive. The temperature is an important factor in maintaining coral reef ecosystems which should range between 68 and 82° F. There are three types of reefs which include atolls, barrier reefs, and fringing reefs. The reefs are important for preserving the biodiversity of the ocean because it removes carbon dioxide, provides food to reef animals as well as protecting the land from destructive storms. <sup>8</sup>

I will first instruct the students on the Rainforest biome, which will serve as the model for their own research and presentation. The mini-unit will consist of the following subheadings:

Characteristics (which includes the layers of the biome)

Climate

Amount of Annual Precipitation

Landforms (if any)

Animals

Plants

Geographical Location

Once this information has been taught, I will then formally propose the dilemma of the human role in this biome. They will be asked to ponder their initial opinions of humans and their effect on the rainforest. Then I will present them with five or six cases highlighting this impact. In turn, they must conclude whether we should be crowned with halos or horns.

African Tropical Rainforest

Case 1- Illegal Bushmeat Trade- Chimpanzees are subjected to illegal poaching in the Congo Rainforest

The Kalande, one of the three major chimpanzee groups found in the tropical rainforest areas of the Gombe National Park in Tanzania, have shown significant reduction in chimpanzee populations. <sup>9</sup> A study was done to confirm the actual population size of this group of chimpanzees, to determine the reason for this decline, hopefully to find ways in which this endangered species of animal could be saved from possible extinction. One of the known causes for the disappearance of these primates is illegal poaching in the southern area of the Park where the Kalande reside. Evidence of snares, dead remains of mutilated and castrated male chimps, as well as hunters and hunting dogs in the area gave great concern to researchers entering the area which

showed that these innocent animals were cruelly hunted down.

A second possible cause to their numbers dropping significantly is the presence of disease. Traces of polio, scabies, and even respiratory illness have been found in other communities of chimpanzees in the northern and central parts of the park. However, this particular group has primarily been isolated based on a habituation project which began in the 1980's. This evidence points to poaching as one of the more likely ways the Kalande community has primarily declined in population, due to the short period of time which transpired.

Interesting enough, there are Congolese communities that live on the outskirts of this park and traditionally view eating chimpanzees, commonly known as "bushmeat", a delicacy. Although this is not a practice of the Tanzanian people, there is a great opportunity for a source of much-needed income for those willing to capture and hunt the chimpanzees. Also given the fact that there is no buffer zone to protect the park and its inhabitants, it is a less complex when attempting to engage in this illegal poaching. Significant strides to protect the population of the Kalande community which has reduced the practices of hunting these primates.

### **Case 2- Wangari Maathai's Greenbelt Movement**

Wangari Maathai is a Kenyan heroine who grew in the presence of the harmonious beauty which exists in an untouched landscape of rivers, mountains, fauna and flora. She learned from her mother the uses of each tree and plant in her village and was taught to respect all nature in its finest purity. However, as British colonization began to take place, her beautiful and beloved homeland begun to be stripped of the emerald trees she knew and cherished in order to clear agricultural space for foreign trees not native to Kenyan soil and cash crops such as tea and coffee production.

After returning from an education abroad in the United States and Germany, Maathai watched her people, namely women, experience dilemmas such as traveling miles to locate and gather firewood for cooking, the loss of land which was traditionally used by the villagers to grow healthy food to sustain their families, and deterioration of the landscape and tainting of the water supply caused by the lack of certain trees. She knew change had to happen in order for these families to be able to sustain themselves. Maathai also realized that her cherished land was becoming a wasteland and needed to create an opportunity to preserve her home. Always being a proactive individual, she created the Greenbelt Movement in order to undo many of the harsh stripping of the land. Maathai began to teach women, children, and others to nurture and plant trees across Kenya. She gained great popularity and encountered much resistance along the way during her long struggle to institute change for her people.

### **Case 3- Creating a National Parks System in Gabon**

The Gabonese made a significant gain in preserving their rainforests by declaring 10 percent of their land a protected National Park. With the great efforts of conservationist Michael Faye, he was able to uncover the hidden Eden which existed in Gabon and brought world-wide attention to the importance of protecting this land. <sup>10</sup> Although extensive logging has been an issue, the Gabonese government made a conscious pledge to cancel leasing contracts with companies looking to cut down the invaluable forest area. Faye embarked upon a 456 day trek from the Congo to Gabon, thus discovering the vast biodiversity found in what is now today a chain of 10,000 square miles of National Parks. The president, El Hadj Omar Bongo, made a courageous decision that would most likely affect the logging industry and income of the Gabonese people. <sup>11</sup> Logging is a significant money source and this effort will lose many companies' support. However, Bongo is committed to this effort to save one of the last naturally existing rainforest areas on the continent of Africa.

## The Amazon Rainforest

### **Case 1: Friends of the Children's Eternal Rainforest**

A classroom filled with first and second grade students from the Fagervik School in Sweden were being taught about the tropical rainforests by their teacher, Eha Kern.<sup>12</sup> They learned all about the animals, plants, and biodiversity of the forests but were also made aware of all of the ways people and their industries were harming them. The students were very moved by this situation and wanted so desperately to find a way to save these forests and make a positive impact. The students then discussed with their teacher the possibility of buying a portion of the rainforest in order to preserve the land from destruction.

Sensing their dedication to this project, Mrs. Kern went on a frantic search to find someone to point her in the best direction. She was paired up with an American biologist, Sharon Kinsman, who was doing work in a Costa Rican rainforest. Mrs. Kern shared the students' desire to buy land to protect, when Kinsman eagerly replied, "Oh. Please buy mine." After this exchange, Kinsman brought materials, pictures and information to share with the Fagervik students about the Monteverde forests which were in peril. The students were convinced more than ever that this was the perfect way to prevent the destruction which this verdant haven faced. They organized and performed shows at the school and created various ways to uniquely raise money for this cause. With each acre costing a relatively small sum of twenty-five dollars, they knew fundraising a great deal of money would preserve many acres of endangered forest.

People all around the world began to learn about these remarkable children who were dedicated to saving this tropical environment. Students, wealthy benefactors, monarchs, as well as government agencies, began to join their efforts in raising funds. With their combined effort, they were able to raise over two million dollars which saved over 33,000 acres of rainforest land. As a result of their amazing contributions, the conservationists renamed the forest El Bosque Eterno de los Niños, or the Friends of the Children's Eternal Forest in Monteverde, Costa Rica.

### Case 2- Mining and Petroleum Exploration in Block 78

Mobil Oil Corporation and the Peruvian government were interested in petroleum exploration in Block 78 of the Peruvian Rainforest. The challenge was how to evaluate the land for possible extraction while preserving the vast biodiversity of the area and leaving it virtually as untouched as possible. There are two sectors which consist of Block 78: The Karene sector which spans the area from the Inambari River to Manu National Park. The Tambopata sector is comprised of the TCRZ, which stands for Tambopata-Candamo Reserved Zone. This area touches the Bolivian border and spans to the Manu National Park, which was created to protect this great diversity of species in the Tambopata sector.

The government, Mobil, and the conservation agencies worked together in order to consider all of the possible effects the exploration for hydrocarbons could have on the ecosystem. They brought in experts to analyze the wild life and area in order to predict the impact this project would have on the environment. Although they used best practices in keeping this project as minimally invasive as possible, there are always damaging results which cannot be avoided. In this case, 56.65 hectares of canopy was deforested and 94 hectares of the understory was deforested in order to create camps and helipads as well as some of the workers hunting local wildlife (although this was not as prevalent due to the helicopters flying in ample food supplies).<sup>13</sup>

Another frightening aspect of this exploration is that some damage may not be known for years, as long-term effects may not be immediately evident to all parties involved. Using a trial and error method does not help

the flora and fauna permanently impacted by these extraction processes. Although credit is given to the thoughtfulness put behind the planning of the extraction of petroleum, the damage will still be done.

### Case 3-Tales of a Shaman's Apprentice

Ethnobotanist Mark J. Plotkin travels to the Amazon rainforest to study the various plants and its medicinal usage. Plotkin wants to work with the indigenous peoples of the Rainforest but wants them to profit from the extraction of plants for medicinal purposes as well as the major companies who procure this native flora. He discusses his mission in the following quote:

"Moreover, it soon became increasingly obvious to me that it was at least as important than the ethnobotanical wisdom be perpetuated within the tribes themselves. To accomplish this, the Indians and I developed a methodology we call the Shaman's Apprentice program, a process by which my notes-the invaluable information supplied by the tribes-are translated back into the local language and studied by a young tribe member who is designated a shaman's apprentice. That individual then teaches the accumulated wisdom to other young members of the tribe, acting in essence as a bridge between the preliterate tradition and a literate future for the tribe. In this way, the indigenous people can control their own destiny, choosing to hold on to a part of their culture that would otherwise slip away." <sup>14</sup>

Plotkin also had a desire for the botanists who come to collect samples to be responsible with their methods by taking small parts of the flowers and bark as opposed to cutting down large numbers of the specimen which may possibly cause harm to the plant. In other words, it is most desirable to collect and harvest these samples in a sustainable way. He also wants a law passed to protect these people and their plants from the drug companies and others looking to make a profit with no benefit from the native people. <sup>15</sup> Plotkin's work brings pertinent information to the medical and pharmaceutical fields, as he has increased the knowledge as well as the availability of new plants and herbs to potentially aid and even possibly cure illnesses that have longed plagued human society.

## Activities

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The unit and the activities will lead to a group project which will be researched, synthesized and presented by the student groups. The students will display their studied ecosystem projects as a living museum in which the class may circulate and learn about these reports.

Activity 1: I will read the book *Rain, Rain, Rain Forest* by Brenda Z. Guiberson to the class. The students will have their science notebooks with them and they will record any facts they encounter during the read aloud in the seven categories listed earlier. This will include amount of rainfall, various plants and animals, and why people would want to visit the rainforest. I will introduce a culminating activity board which will be filled with information about the rainforest as we learn about the biome. We will begin a list of the animals and plants found in this read-aloud on the board. After the read aloud, the students will be able to list at least 20-25 types of plants, trees, insects and animals found in the rainforest. After the read aloud, I will introduce the following vocabulary words for the students to define in their notebooks: biome, ecosystem, biotic factor, abiotic factor, climate, precipitation, organism, predator, prey, and scavenger.



Activity 2: The students will learn about the four layers of the rainforest: the forest floor, the understory, the canopy, and the emergent layer. They will find in which layer the plants, animals, and insects live. Then, we will add the four layers to our culminating rainforest board by representing the layers with different colored paper (ex. Dark green, light green yellow, brown) and label these layers on the board. We will discuss the climate, amount of precipitation, and geographical locations rainforests are found around the world.

Activity 3: The students will each choose an animal from the rainforest and using the internet, and teacher selected library books, they will create a miniature drawing of their chosen animal and write a paragraph about the animal and its role, or niche in the ecosystem is. I will introduce the vocabulary words which they will add to their science vocabulary notebooks: niche, population, community, habitat, camouflage, producer, consumer, and decomposer. The students will find information about what the animal eats, which animal eats it, its habitat within the rainforest, mating habits, and how it may camouflage itself in its environment. They will then place their animal on the culminating rainforest board and their edited and published paragraphs of their animals will be displayed.

Activity 4: The students will watch a video entitled "You in the Food Web" on the educational website [www.discoveryeducation.com](http://www.discoveryeducation.com). This discusses what food and energy are, as well as what a food chain is. The students will then complete the accompanying video quiz and activity found in the teacher resources tab attached to the video. After this is complete, the students will create their own food chains using the animal they researched in the previous activity. They will be given paper circle cut-outs to draw each organism and the order in which they exist in the food chain, being sure to begin with the Sun. They will be colored and displayed after completed. I will then discuss the following vocabulary words which the students will add to their science notebooks: herbivore, carnivore, omnivore, food chain, food web shown in the video and review others from the previous activities.

Activity 5: The students will define the vocabulary word *resource* and then learn about the various natural resources that are found in the rainforest by visiting the website: [www.folklife.si.edu/resources/maroon/foodways/more.htm](http://www.folklife.si.edu/resources/maroon/foodways/more.htm). There is an extensive list of products, foods, and medications which are extracted from the rainforest which can be found here. We will discuss the importance of resources which are found in various ecosystems and to have students begin to think about responsible ways in which we can retrieve these resources. This activity is a precursor to the cases which will be presented to the class.

Activity 6: We will discuss the human impact on ecosystems and they will have to determine whether they believe that humans are generally impacting the rainforests in a positive way or in a negative way based on the information given. The students will be presented with the cases from the African Rainforest. I will read the picture book *Planting the Trees of Kenya: The Story of Wangari Maathai* by Claire Nivola and we will discuss as a class whether this is a positive or negative human impact. The students will add this to their science notebooks with a brief reflection. I will create a section on our culminating rainforest board on human impact in which I will add this example. I will not put whether it is negative or positive. The students will determine this as a group or as individuals if their opinions vary. The second case I will present is by showing the class a video entitled "Endangered animals - illegal bush meat hunters kill apes, gorillas and other monkeys - BBC" which can be found on [www.youtube.com](http://www.youtube.com). We will discuss this practice and the students will determine whether this case is a positive or negative human impact. I will add this to the board and the students will write a brief summary of the video and a reflection in their notebooks. I will then present the third case affecting the African rainforest by reading the article on the preservation of the Gabonese forests by creating a national parks system. The students can view pictures of these rainforests from the internet and

then the students will determine whether the third case is positive or negative. They will record the information in their notebooks and then write a brief reflection. I will post the third example on the board.

Activity 7: This activity will mirror activity 6 in structure but the information and the cases will be based on the Amazon rainforest. I will present the class with the first case by reading the picture book *The Great Kapok Tree: A Tale of the Amazon Rain Forest* by Lynne Cherry. We will discuss the book and I will share with them that it is based on a true story an ethnobotanist who went to the rainforest to study with the shamans, while working diligently to also help the people preserve their culture and record their findings in a book. The students will discuss this case and determine whether they believe it is a positive or negative human impact. They will add this information to their notebooks and write a brief reflection on their findings. I will present them with the second case of the extraction of petroleum resources from the forest and also show a brief video on the educational website [www.discoveryeducation.com](http://www.discoveryeducation.com) entitled "Deforestation: How human activity affects the rainforest". This is a two minute animated video which touches on the various ways humans contribute to the deforestation of the rainforest for various products. They will discuss this case and add this to their notebooks with a brief reflection. I will then add this case to the culminating rainforest board. I will share the last case with them in which we will read along with the story of the Fagervik Children of Sweden and how they raised money to save a Costa Rican rainforest. Our district has a reading textbook series entitled *Imagine It*, which contains this kid-friendly short story. If this cannot be found, you can reference the story from the book *It's Our World, Too! : Young People Who are Making a Difference: How They Do It—How YOU Can, Too!*, written by Philip Hoose or you can reference the website <http://suememhard.com>. After the students read the story, they will discuss whether they believe it to be a positive or negative human impact and add it to their notebooks with a reflection. I will post the last case on the rainforest board.

Activity 8: The students will write an essay on their personal conclusion on whether they feel humans are positively or negatively affecting the rainforest biome. They must have at least two reasons why they came to this conclusion and will write this essay in argument form. This may take some days for the prewriting, revising, editing and publishing to happen. I will provide the students with other articles and books to assist them in strengthening their arguments. After they are complete, we will share them with the class and display the essays for others to read.

Activity 9: The students will then select a biome or ecosystem of their choice and they will use the same format researching information on the categories previously listed in the rainforest model (characteristics, climate, precipitation, animals, plants, etc.) They will write their first three choices of the ecosystem they would like to study independently or with a study group. I will create the groups based on interest and being sure to cover all ecosystems so that we are able to learn about each one. They will use the internet as well as the library in order to research their ecosystem. The students will collect their information in notes recorded in their notebooks.

Activity 10: Students will select an animal from their chosen ecosystem or biome they are interested in studying. They will research the animal's habitat, physical characteristics, its niche in its particular ecosystem (What does it eat? What hunts or eats it?), adaptations, and challenges its species may be facing. After completing the research, the students will compile this information in possibly two neatly handwritten or typed paragraphs to be glued on to a large index card. In the next step, the students will create a paper bag puppet representing the animal they researched and it will be displayed with their research. Students from a lower grade class, such as kindergarten or a first grade, can visit each animal. My fifth grade students will use the paper bags as puppets and talk to our visitors as if they were the animal they researched. The kindergarteners can ask the animal questions to learn more about it.

Activity 11: The students will then research any dilemmas their ecosystem is facing presently and will determine how humans may be a part of this problem. As a group, they must also discuss a solution to the problem their ecosystem is facing.

Activity 12: The students will all be presented with a blank science fair trifold poster board and will present their information on their chosen ecosystem in a creative and attractive way. We will have a walking museum in which these findings will be posted around the classroom for students from other classrooms can visit and view. They will then present their findings on what they've learned to the class.

Activity 13: Now what? I will present this question to the class and discuss with them the many negative events which are impacting our way of life around the world. I will pose the questions to them and ask them to devise a solution to one dilemma which exists in the world and have them develop an idea in order to contribute a positive change. They will have to present their ideas to the class and the students will have to vote on the project they want the class to pursue. We will use other classes, professionals, and possibly agencies to make this come into fruition.

## Strategies

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### **Cooperative Learning Groups**

Cooperative Learning Groups is a skill that not only helps students to process concepts and complete activities with peer help and guidance but allows the development of social skills, along with cooperation, team building, and leadership skills. Students can benefit from being exposed to the various ideas and thought processes of peers in order to assist in developing their own thought processes. I will use this strategy in my unit during the debate activity, in which the students will convene together to discuss issues that affect the side they are arguing for. They will need to discuss and choose the important issues that they will sway the opposing side to agree with their point of view.

### **Summarizing and Note-Taking**

It is important for students to learn the strategy of summarizing and note-taking. Students need to know how to synthesize and process information in a meaningful way. They need to learn how to take a large amount of text and filter through it in order to find the information that meets their needs. The students also need to be able to take the information and concisely list only the pertinent information into a summary. I will use this strategy in my unit during the final culminating research activity. The students will choose a specific topic or aspect of the biome or ecosystem they would like to focus on. They will then begin to gather their resources and materials they will need for their project. After they have the materials, I will guide them through the process of how to take notes and select important information and facts and to discard the frivolous information. I will also do mini-lessons based on how to take the information they gather and summarize it into a cohesive paper.

## Possible Teacher Resources

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Brenner, Barbara. *One Small Place in a Tree*. New York: Harper Collins, 2004.

This is a great resource for the Deciduous Forest biome. It weaves a tale around the idea of being able to watch the process of how one hole in a tree develops over time. It shows various organisms that make their habitat inside the tree.

Castaldo, Nancy F. *Rainforests: An Activity Guide for Ages 6-9*. Chicago, Ill.: Chicago Review Press, 2003.

This is a book which contains many fun activities, experiments, and facts about various rainforests across the world. This is great to use as a book to create extension activities and crafts when learning about the rainforest.

Cherry, Lynne. *The Great Kapok Tree: A Tale of the Amazon Rain Forest*. San Diego: Harcourt Brace Jovanovich, 1990.

This book is a reflective tale of a human who enters the Rainforest with the intention of cutting down a great, old kapok tree. As he tires from chopping the tree, he lies down at the foot of the tree for a brief nap and the native animals of the forests share subconscious pleas with him in order to convince him not to cut down the tree, as it is a part of their home and livelihood. As the man walks out of the forest, changing his mind, we all have hope that others will do the same. This is a book which shows faith in the goodness of people and what they are capable of being.

Cherry, Lynne. *A River Ran Wild: An Environmental History*. San Diego: Harcourt Brace Jovanovich, 1992.

A tale weaved around a river which was once pure and clean, and the true name of the river given by the Native Americans, Nash-away, which showed the pebbled bottom. However, over time industrialization began to dirty the river until pollution was evident and inhabitable by animals. A woman, Marion Stoddart, was saddened by the state of the river and began a campaign to clean the Nashua River. Eventually, the government saw the importance of preserving the river and putting crucial environmental laws in place to protect the environment and regulate how industries dispose of their wastes.

Cherry, Lynne, and Mark J. Plotkin. *The Shaman's Apprentice: A Tale of the Amazon Rain Forest*. San Diego: Harcourt Brace & Co., 1998.

Based on a true story from Mark J. Plotkin's travels to the Rainforests on his ethnobotanist studies, a young boy is rescued from death from a village shaman. This young boy goes on to value the importance of this ancient practice of medicine, using the herbs and plants which exist in the forests around them. It also highlights the importance of passing this art down to new teachers in order to sustain the studies of the shaman alive in their native culture.

Cherry, Lynne. *The Sea, the Storm, and the Mangrove Tangle*. New York: Farrar Straus Giroux, 2004.

This is a beautiful story which shows the interconnectedness of various creatures who live by the sea. It shows how one seed from a mangrove called a propagule floated off and began to grow on a faraway lagoon. This particular seed grew, creating a safe and harmonious habitat for many fish, crabs, birds, dolphins and many other animals. The author, Lynne Cherry, wrote the book to show the importance of maintaining these mangrove ecosystems which are in jeopardy of being cut down in order to access the shrimp and freshwater fish which reside there. Unfortunately, when the mangroves are destroyed, other dilemmas such as flooding, erosion, pollution and destroying coral reefs begin to surface and they damage the coastal area's wildlife.

Cherry, Lynne, and Gary Braasch. *How We Know, What We Know, About Our Changing Climate: Scientists and Kids Explore Global Warming*. Nevada City, CA: Dawn Publications, 2008.

In the midst of all of the negative and disparaging tales of the human effects on the environment, this is a light which allows our youngsters to continue to have hope in our future. There are encouraging statistics which show that there are many hopeful clues about our environment's future which scientists are discovering daily. This is a wonderful resource to share with your students in order to spark ideas and get them motivated to create their own stamp in reducing their ecological footprint.

Cooney, Barbara. *Miss Rumphius*. New York: Viking Press, 1982.

A touching story of how one woman, Ms. Alice Rumphius, makes a promise to her grandfather that she would do three very important things in her life: travel the world to exotic places; live by the sea; and do something to make the world more beautiful. She passes on these traditions to her own great-niece and contributes beauty to her world by planting colorful lupines to the local landscape. This is a testament to children that we can all contribute one small deed to make a big difference.

Geisel, Theodore Seuss. *The Lorax*. New York: Random House, 1971.

This is a classic story which shows the detrimental effects on the environment when too much attention is paid to making a profit and not on the surrounding world. The trees are cut, smog and pollution are rampant, and the area becomes uninhabitable. It is a good story with a heart-warming moral, with great illustrations, and the fun characters we all know and love in a Dr. Seuss book.

Guiberson, Brenda Z.. *Rain, Rain, Rain Forest*. New York: Henry Holt and Company, 2004.

This is a picture book which focuses on the beauty and the biodiversity of the rainforest. It shows the many plants and animals which exists in the biome and shows the interactions amongst the creatures.

Hoose, Phillip M.. *It's Our World, Too!: Young People Who are Making a Difference : How They Do It—How YOU Can, Too!*. New York: Farrar, Straus and Giroux, 2002.

This is an inspiring collection of stories about how young people all over the world made changes by challenging society on various issues.

Johnson, Jen Cullerton, and Sonia Lynn Sadler. *Seeds of Change: Wangari's Gift to the World*. New York: Lee & Low ;, 2011.

Another picture book about Maathai, the illustrations are colorful and quite beautiful. This story, although similar, highlights her educational career and shows how women were not educated in the sciences as men were. They also touched on the corrupt businesses profiting from the treeless land cleared for crops and how they paid cops to arrest Maathai. This is a wonderful snapshot of the Nobel Peace Prize winner and environmentalist and how she tirelessly traveled and shared her philosophies with others in order to make the world better for the future.

Kamkwamba, William, and Bryan Mealer. *The Boy Who Harnessed the Wind: Creating Currents of Electricity and Hope*. New York, NY: William Morrow, 2009.

This is a story about a fourteen-year old from Malawi, Africa who decided to build an electricity-producing windmill from spare parts he found around his home. He invented the windmill in order to provide his home with electricity.

Napoli, Donna Jo, and Kadir Nelson. *Mama Miti: Wangari Maathai and the trees of Kenya*. New York: Simon & Schuster Books for Young Readers, 2010.

This is a story of how Wangari Maatthai helped her people. With each dilemma they faced, Wangari had a tree specific to their needs

be it for animal fodder, firewood, or sustenance for their families. With beautiful illustrations by Kadir Nelson, this book is sure to entertain children of all ages.

Nivola, Claire A.. *Planting the Trees of Kenya: The Story of Wangari Maathai*. New York: Farrar, Straus, and Giroux, 2008.

Another wonderful picture book, "Planting Trees" is a story which highlights Wangari Maathai and her Greenbelt Movement which started in her Kenyan homeland, and spread throughout Africa. This book is unique because it discusses the negative changes in the landscape which changed because of the lack of trees such as keeping the soil in place, losing crucial topsoil, and dirtying the water with silt and in the culture of the people such as buying expensive and unhealthy food from the stores, little milk produced by cows and no firewood. The tale weaves from despair to solution and Maathai shows the people how to change their situation through schools, prisons, as well as women and men in the villages.

Osborne, Will, Mary Pope Osborne, and Sal Murdocca. *Rain forests: A Nonfiction Companion to Magic Tree House #6, Afternoon on the Amazon*. New York: Random House, 2011.

This is a non-fiction companion guide to *Afternoon on the Amazon*, also by Mary Pope Osborne. This book contains illustrations and descriptions of the various animals you will find in the rainforest. Another great feature of the book is it also contains information and facts about the people who are native to the rainforest lands as well as the products made from the rainforest and ways to preserve the lands. Finally, there is also a detailed research section which recommends other books, places to visit and websites to use for more information.

"Sue Memhard Fine Art, Poems, Stories." Sue Memhard Fine Art, Poems, Stories. <http://suememhard.com> (accessed July 16, 2012).

This website discusses the amazing journey of the Fagervik school children in Sweden and how they raised money to save thousands of acres of land in the Monteverde rainforest in Costa Rica. There is also a poem written by Sue Memhard which is interactive. She mentions many of the animals which are native to the rainforest and if you click the links, it will connect you to a picture of the particular animal.

Wargo, John. *Green Intelligence: Creating Environments That Protect Human Health*. New Haven, Conn.: Yale University Press, 2009.

This book is an amazing account of true events which resulted in detrimental and harmful environmental mishaps across the globe. It is an eye-opening resource which chronicles historical events such as Chernobyl and weapons testing in Vieques. It is important to make note that the author was my seminar leader and an amazing resources on a variety of environmental issues.

Winter, Jeanette. *Wangari's Trees of Peace: A True Story from Africa*. Orlando [Fla.: Harcourt, 2008.

This is another story about Wangari's life and her vast Greenbelt Movement which spread across Africa. This also chronicles the corruption of the government and the local timber companies which did not want this movement to spread to the people and shows how Maathai was beaten and jailed by the local police who were paid off by the big companies. It is a touching tale with colorful illustrations.

Yahgulanaas, Michael Nicoll, and Wangari Maathai. *Flight of the Hummingbird*. Vancouver: Greystone, 2008.

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*Macmillan McGraw-Hill Science*. New York: Macmillan/McGraw-Hill, 2005.

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## Implementing District Standards

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North Carolina Science Essential Standards

5.L.2: Understand the interdependence of plants and animals with their ecosystems

Substandards:

5.L.2.1: Compare the characteristics of several common ecosystems

5.L.2.2: Classify the organisms within an organism according to the function they serve: producers, consumers, decomposers (biotic factors)

5.L.2.3: Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

## Appendix

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The following are vocabulary words from our district's science textbook <sup>16</sup>, which are taught throughout the unit. They are defined for your reference and convenience:

1. adaptation- a characteristic that enables a living thing to survive in its environment
2. aquifer-an underground layer of rock or soil filled with water
3. atmosphere -a blanket of gases that surround the Earth
4. camouflage-an adaptation in which an animal protects itself against predators by blending in with the environment
5. carnivore- an animal that eats another animal
6. carrying capacity-the maximum population size that an area can support
7. climate-the average weather pattern of a region
8. commensalism-a relationship between two organisms that benefits one without harming the other
9. community- a group of various populations living in one area
10. consumers-animals who eat producers and other consumers
11. decomposers- any of the fungi or bacteria that break down dead plants and animals into useful things like minerals and rich soil
12. deposition-dropping off bits of eroded rock
13. ecological succession-the gradual replacement of one community by another
14. ecology-the study of how living and nonliving things interact
15. endangered species- a species that is in danger of becoming extinct
16. erosion-the picking up and carrying away of pieces of rock
17. extinct species-a species that has died out completely (ex. dinosaurs)
18. fertilizer-a substance used to add minerals to the soil
19. food chain-the path of energy of food from one organism to another
20. food web-an overlapping of various food chains in a particular ecosystem
21. fossil fuel- a fuel formed from the decay of ancient forms of life
22. habitat -where one species of animal or plant naturally lives or grows
23. herbivore- an animal that eats plants, algae or other producers



24. humus-decayed plant or animal material in soil
25. inexhaustible resource- a resource that cannot be depleted or used up easily
26. limiting factor- anything that controls the growth or survival of a population
27. mimicry- an adaptation in which an animal is protected against predators by its resemblance to another unpleasant animal
28. mutualism- a relationship between two organisms that benefits both
29. niche- the role of a particular organism (ex. What does it eat? What eats it?)
30. nonrenewable resources- a resource that cannot be replaced within a short period of time or at all
31. omnivore-an animal that eats both animals and plants
32. organism- any living thing that can carry out its life on its own
33. ozone layer- a layer of ozone gas in the atmosphere that screens out much of the Sun's UV(ultraviolet) rays
34. parasitism- a relationship in which one organism lives in or on another organism and benefits from that relationship while the other organism may be harmed by it
35. photosynthesis-the food-making process in green plants that uses sunlight
36. pioneer community-the first community thriving in a once lifeless area
37. pioneer species-the first species living in an otherwise lifeless area
38. population- a groups of one species (ex. A population of mountain lions, a population of iguanas)
39. precipitation-rain, sleet, snow, or hail
40. predators -animals that hunt other animals
41. prey - animals that are hunted by other animals
42. primary succession- the beginning of a community where few, if any, living things exist, or where earlier communities were wiped out
43. producers-organisms such as plants, trees, grasses, and algae which produces oxygen and uses the sun's energy to create its own food
44. renewable resources- a resource that can be replace in a short period of time
45. resource- any material that helps support life on Earth
46. scavenger- meat-eating animal that feeds on the remains of other animals
47. secondary succession- the beginning of a new community where an earlier community already exists

48. symbiosis- a relationship between two organisms that lasts over time
49. threatened species- a species that is in danger of becoming endangered
50. weathering-breaking down rocks into smaller pieces

## Endnotes

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2. Hoose, P. *It's Our World Too! Young People Who Are Making a Difference: How They Do It- How You Can, Too!* , 83-93.
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12. Hoose, P. *It's Our World Too! Young People Who Are Making a Difference: How They Do It- How You Can, Too!* , 83-93.
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14. Plotkin, M. *Tales of a Shaman's Apprentice: An Ethnobotanist Searches for New Medicines in the Amazon Rain Forest*, 18.
15. Plotkin, M. *Tales of a Shaman's Apprentice: An Ethnobotanist Searches for New Medicines in the Amazon Rain Forest*, 16-17.
16. Macmillan McGraw-Hill, "Ecosystems", New York: Macmillan/McGraw-Hill, 2005.

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