

◀ ENVIRONMENTAL ETHICS ▶



Examining Your Connection
to the Environment
and Your Community



Student Workbook

The Goldman
Environmental
Prize



ENVIRONMENTAL ETHICS

Examining Your Connection
to the Environment
and Your Community.

STUDENT WORKBOOK

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OVERVIEW

Environmental Ethics offers you an exciting opportunity. You will meet people from around the world who have shown initiative and courage for a cause: protecting the environment. This is a course about environmental ethics. This may be a new idea to you, but it relates to everybody and each decision we make. In short, environmental ethics relates to how people should act to use, protect, and improve the natural world in which we live.

In each of the environmental ethics lessons, you'll explore a different natural resource, including wildlife, forests, water, air, and minerals. You'll watch video profiles about people who felt an ethical responsibility to preserve their environments. The people who are the subjects of these video profiles have all been awarded the Goldman Environmental Prize, which is given to ordinary people who have done extraordinary work to protect the environment. You'll also learn about the ethical concepts of utility, justice, and duty, which people, like the Goldman Prize winners, use to weigh decisions with regard to the environment and justify their actions. This Student Workbook gives you an overview of the video profiles, the topics, and also contains worksheets.

Be sure to visit the Environmental Ethics Network at www.envethics.org to access additional resources, connect with other students, and present your own community projects. You can also find links to websites focused on how resource management industries view the issues discussed in this curriculum.



INTRODUCTION TO ENVIRONMENTAL ETHICS AND THE ECO-ETHICAL MOUNTAIN

Background

Two questions start this discussion of environmental ethics: "What is the environment?" and "What is ethics?" In addition to discussing those two topics, this introductory unit presents a tool called the Eco-Ethical Mountain, which helps in considering several important facets of environmental ethics.

But first, you may have a question of your own: "Why should we care?"

Video #1: Why Should We Care?

Why is the environment important? People value the environment for a range of reasons. For example, some may think it's important because of the beauty of the natural world. Others may point to the interdependent ecosystems that provide us with food to eat, water to drink, and air to breathe. As we take a visual tour of the natural wonders of our planet, consider this simple answer: "Because we all play a part."

Topic 1: What Is The Environment?

Consider beautiful scenes of forests, mountains, rivers, and oceans—all of these magnificent ecosystems make up the world in which we live. We sometimes call this "nature" or the "environment." Many of us live in cities and suburbs, where buildings and freeways are always in sight, and we have to travel to see a towering mountain or a pristine forest. Others live in the country, where fields are open and hills are near. But whether we live in urban or rural areas, we are surrounded by nature. In fact, the word environment means "surroundings," and includes everything around us—the living things, like plants and animals, and the non-living things, such as air and water. The environment includes everything that makes life on Earth possible.

When we say that the word "environment" refers to our surroundings, we obviously mean that people are surrounded by the natural world. Yet, we must also recognize that people are part of nature and that our lives depend on the air we breathe and on the food that grows from the Earth. We are constantly in contact with things that are human-made. Our homes, clothing, cars, paved streets, school buildings, and playing fields are all a result of human engineering and will. But even these human-made things are comprised of the wood, metal, fibers, and fluids that come from nature. So the environment really refers to us in our surroundings.

Topic 2: What Is Ethics?

Ethics is the study of reasons for right and wrong actions. Right and wrong, as well as good and evil, are words used to describe ethics. However, it's not easy to explain what those words mean, as they don't refer to things that we can see, feel, or measure. We can see a giant sequoia, measure its height, and calculate its age. We can describe its colors and the form of its needles. But if we hear someone say, "It is wrong to cut down that sequoia," we're going beyond what we can see, hear, or feel.

For centuries, philosophers have thought about what constitutes "right" and "wrong" and have attempted to explain those concepts. In ancient China, the philosopher Confucius said, "Failure to cultivate moral strength and to explore what I have learned, failure to stand by what I know to be right and to reform what is not good—these are my worries." Throughout his life, Confucius attempted to understand the right and the good and to act according to his understandings. He also tried to teach those understandings to others. In ancient Greece, Aristotle wrote, "We are studying not to know what goodness is, but how to become good men. Thus we must apply our minds to the problem of how our actions should be performed." Aristotle attempted not only to explain what "right" and "good" meant, but also how people should actually perform right and good actions. Confucius, Aristotle, and many other scholars have written great books about ethics.

But ethics goes beyond what is written in books. It also exists in the beliefs and actions of every person and in the arguments that every person makes to explain why they hold certain beliefs and perform certain actions. People—whether they are activists, religious leaders, or politicians—are often not satisfied by only explaining what they do; they also attempt to convince others to follow their example. So the field of ethics is particularly interested in the reasons that can be given to show that an action is right and that its results are good.

Finally, ethical discussions must be based on the best facts we can gather about the problem and on reliable scientific theories, if the debate is about the ethics of a scientific matter. It is easy, but wrong, to argue about an ethical problem by appealing to emotions alone. Thus, in this Workbook, we will try to get the facts and the science correct as we discuss ethical concerns.

Topic 3: What Is Environmental Ethics?

Sometimes we live in harmony with nature and appreciate the environment in many important ways. But now more than ever, as our population increases and technology advances, human actions have the potential to harm the environment. Forests can be cut. Mountains can be carved away by mining. Rivers can be diverted by dams. Air and water can be polluted by human waste. We are not only dependent on the natural world; we are changers, and sometimes destroyers, of the natural world. So we must learn that natural resources must be used thoughtfully and safely and that overuse can harm both the environment in which we live and human health. This is the subject of environmental ethics.

Every day we face ethical decisions regarding how we should live in the natural world. Some of the questions addressed in environmental ethics include:

- Should there be limits on what we choose to do with nature?
- Do we have a duty to protect nature? Could our duty ever require us to save a plant, animal, or habitat, even if that means that we must make some sacrifice?
- What should we do to protect the environment so that we, and our descendants, can continue to enjoy and benefit from the natural world?
- How should we harvest and make use of natural resources without exhausting those resources?
- Do trees and animals have rights of their own?
- Does the natural world have a value apart from its support of human life?

Environmental ethics provides insight into these questions and guidance on how to act upon those insights.

As part of this curriculum, you'll watch video profiles about persons who took environmental ethics seriously. The people profiled in the videos acted in ways that they believe are right. They took actions even though those actions were difficult and sometimes even brought them suffering. They took those actions to save something good from destruction. The people and institutions that opposed the activists believed that the activists' actions were wrong. The oppositionists thought that they were right in trying to stop the activists' efforts. It is known as an ethical conflict when people's disagreements are grounded in their basic beliefs. By studying ethically related conflicts, we can explore how people justify their beliefs and what motivates them to take action.

In the first video profile, we meet Kory Johnson, a high school student who is much like any other American teenager. She is a cheerleader and is interested in dance. However, unlike her fellow students, she has also been an environmental activist since age nine. Does she remind you of any of your friends or classmates? Why do you think she got so involved in environmental issues?

Video #2: Kory Johnson, United States, 1998

When Kory Johnson was nine, her older sister died from heart problems that may have been caused by polluted drinking water. Johnson found out that others in the neighborhood had suffered from similar ailments, and established an organization called Children for a Safe Environment. Through letter writing, public education, protests, demonstrations, and children's art projects, Johnson and her organization have fought hazardous waste incinerators, supported recycling programs, and taken stands on other issues where they believed that human health was put at risk by bad environmental practices.

Topic 4: The Eco-Ethical Mountain

The Goldman Prize winners are people who deeply appreciate their environment and take personal responsibility for the ways that human behavior affects the environment. Through videos and discussions, you'll explore how and why the prize-winners consider what they do to be important. The videos, discussions, and activities will also provide tools to help explore your own relationship with the natural world.



Each lesson is divided into three sections based on the ideas that underlie environmental ethics: appreciation of the problem, understanding the ecology of the problem, and taking responsibility for a solution. These three “building blocks” for environmental ethics make up the different levels of a tool called the Eco-Ethical Mountain, which can help to explore people’s perceptions of right and wrong with regard to the environment. To set the stage for addressing specific environmental issues, we’ll explore each level of the mountain in more depth.

Appreciation of the Problem

We usually live comfortably in our environment. The air we breathe, the plants that feed us, the animals that are our companions—we take these things for granted. Sometimes we do more: we “appreciate” our environment. Appreciation means to recognize the value or utility of something. There are many different ways to value things. For example, we may love the place where we live or enjoy visiting a beautiful place. We learn how various parts of the environment help us live. Finally, we might have a deep respect and reverence for the physical world and its creatures.

As we learn more about our environment, we become aware that these familiar things are often threatened or endangered. In some places, air is polluted. In others, trees and plants are excessively harvested and uprooted. In certain places, fresh, clean water is becoming scarce. Some animals have become extinct, while others are in danger of extinction.

These environmental threats occur for a variety of reasons. When we realize that human choices may be causing or contributing to them, we face an ethical problem: Are the human actions that threaten the environment right or wrong? What is the right thing to do to prevent actions that harm the environment? To answer these ethical questions, we must first appreciate the natural resource and understand its value. Therefore, appreciation is at the broad base of the Eco-Ethical Mountain. Each video shows how a Goldman Award winner appreciated the natural world around her or him.

The Ecology of the Problem

Ecology refers to the relationships, connections, and interactions that occur among various parts of the environment. We already know about many of these connections; for example, we understand that plants cannot grow without water. But others are not as obvious. For example, do you know that trees contribute to the quality of the air?

Ecology is a science. Scientists conduct research and reach conclusions that are as unbiased, or objective, as possible. Scientific arguments are not proven by appeals to emotions or personal beliefs. They aim to report only what can be proven through careful observation and strict analysis of facts. When making ethical arguments, however, people often draw on scientific knowledge to support their beliefs. To determine the validity of an ethical stance—especially with regard to the environment—it is important to explore the latest scientific understanding of environmental problems. As scientific facts must be rooted in observation and systematic study, the next level of the Eco-Ethical Mountain is narrower and more refined than the broad level of appreciation.

Ecology demonstrates the relationships among communities of plants, animals, soil, air, and water, showing how elements are dependent on each other. The lessons in this course discuss how human communities are also linked to—and, indeed, are a part of—these nonhuman communities.

Responsibility for a Solution

The Goldman videos highlight how the prize-winners felt a responsibility to solve the environmental problems that they recognized. An important ethical principle associated with responsibility is duty, which implies an inflexible obligation to take certain actions. Each lesson highlights the duties that the prize-winners felt toward the natural world and explores the responsibility that each of us has to our local environment.

At the peak of the Eco-Ethical Mountain, we find the small set of ethical principles that determine the responsibility people feel to take certain actions. These principles include concepts like utility, justice, and duty. Utility is related to the responsibility to satisfy human needs to the extent possible. Duty describes the responsibility to accept an inflexible principle and act on it. Justice refers to the responsibility to assure that all people—including those who are alive today as well as those who will live in the future—benefit equally from the world's resources.

The principle of justice is associated with the idea of community—how humans and nature are linked together by sharing benefits and bearing burdens derived from the use (and misuse) of natural resources. Each lesson also explores how these ethical principles motivate environmental activists.

By building on appreciation and ecological knowledge of an environmental issue, strategies for addressing the problem can be developed. In real life, a complex web of interrelated factors often surrounds each ecological issue. These complex factors can limit the options available for resolving the problem. To help determine the best and most effective path forward, it is important to learn which of the factors can be changed and which cannot. Imagination, energy, courage, and perseverance are critically important in working toward just, equitable, and creative solutions.

Building the Mountain

To consider environmental ethics, the mountain is built on the three principles of appreciation, ecology, and responsibility. Appreciation forms the mountain's base, the broadest level. For example, if you take a particular aspect of the natural world, such as wildlife, you may start at the base of the mountain and ask what values there are in wildlife: Is wildlife useful to humans? Does it have a value in and of itself, apart from any use to humans?

Ecology forms the next level of the mountain, where a scientific understanding of the resource or environmental issue becomes important. While the values expressed at the appreciation level can be very diverse—and at times even in conflict—the ecology level considers only those things that can be proven by careful research. This level of the mountain is narrower, refined by the scientific method of observation and analysis.

Responsibility forms the top level, where we consider the ways we ought to act to preserve a resource in light of an ecological understanding of an environmental issue. For example, do we have a duty to protect the environment? How can we increase its utility? From this higher perspective, we can also explore relationships and communities and ask whether the benefits and risks of our actions are justly distributed. Through the lens of responsibility, we often debate the conflicts that arise in environmental ethics: Should certain human needs—such as those for energy supplied by oil—be satisfied by risking harm to some natural good, such as the protection of a species or a national park? This level is even narrower than the ecology level, as the responsibility we feel is limited to a certain range of actions rooted in our knowledge and beliefs.

We cannot make good decisions about environmental problems without a thoughtful review of each of these levels of the Eco-Ethical Mountain. As a tool, the Mountain also helps us to understand the beliefs and actions of people with whom we disagree.

Throughout each issue that we'll discuss, the Mountain serves as a framework to assemble the knowledge required to understanding the ethical problems. In the videos, amazing people from around the world who have gone through this intellectual journey provide inspiration. Upon reaching the peak of the Eco-Ethical Mountain, many of the Goldman Prize winners have discovered in themselves a deep sense of responsibility to act to protect the environment. Whether you consider these people to be heroes, or whether you disagree with their arguments and actions, this Workbook will help you think about the ethical implications of our relationship with the natural world, discuss and debate environmental ethics with your colleagues and classmates, and apply this thinking to make responsible and ethical decisions about the environment in your own community.

Vocabulary Organizer Directions: Use the information in the Introduction to Environmental Ethics and the Eco-Ethical Mountain section in this workbook to complete the vocabulary organizer. Write a definition for each word, use the word in a sentence, and draw a visual memory clue that will help you remember the word.

VOCABULARY ORGANIZER

Introduction to Environmental Ethics and the Eco-Ethical Mountain

Word	Definition	Sentence Use the word in a sentence	Picture Visualize the word by drawing a picture
Appreciation			
Ecology			
Environment			
Environmental Ethics			

Ethical Conflict			
Ethics			
Responsibility			

INTRODUCTION WORKSHEET

Debating the Environment

Environmental issues are complex and have many sides. People have different perspectives, and often make very persuasive arguments to support their opinions. Ethics helps us consider what is right and wrong in light of our own personal perspectives. Sometimes we will agree on certain fundamental and ethical beliefs—such as the belief that people shouldn't be able to kill other people. But often we are forced to weigh the pros and cons, the costs and benefits, and each person may come to a different conclusion.

You will be assigned to take a position on one of the issues below. Prepare a short (three-minute) speech to support either the point or the counterpoint, and conduct research to make as convincing an argument as possible. To strengthen your argument, be sure to include at least one scientific fact, one social impact, and one personal statement of appreciation.

Should we change nature?

Point: Yes, we need to change nature to live our lives.

Counterpoint: No, if we change nature too much we will destroy it.

Should there be limits on what we choose to do with nature?

Point: Yes, if we don't set limits on what businesses or individuals can do, we will pollute the environment.

Counterpoint: No, environmental regulations put animals or trees before people, and people should be able to do whatever they have to do to survive.

Are we obligated to protect nature, even if that means that we must make some sacrifices?

Point: Yes, human beings have a duty to be stewards of nature.

Counterpoint: No, it is not necessary for human beings to make sacrifices for animals or the environment.

Should we think about future generations when we're exploiting natural resources?

Point: Yes, we need to live in a sustainable manner, so future generations will have the same resources we have.

Counterpoint: No, we shouldn't worry about future generations because they will develop new technologies and innovations.

Do trees and animals have rights of their own?

Point: Yes, as living things, plants and animals have rights.

Counterpoint: No, only humans have rights because we are smarter and more sophisticated than other animals.

Does the natural world have a value apart from its support of human life?

Point: Yes, the natural world has intrinsic value, and things should be protected even if they have no apparent economic value.

Counterpoint: No, things in nature are only valuable if they provide some sort of material or nonmaterial benefit to humans.



Background

We share the world with many other creatures— plants, animals, and microorganisms. These creatures, along with their genetic makeup and the extraordinary array of habitats in which they live, are referred to collectively as biological diversity, or biodiversity for short. Biodiversity refers to the variety of life on Earth—everything that crawls, flies, and swims; every marine, forest, or desert habitat; and the interactions among all of those living things and their habitats.

The world is filled with living things. Some scientists estimate that more than 10 million species of plants and animals exist in the biosphere. About one million species are called animals, which are creatures that are created through a process of fertilization of an egg by sperm. Those fertilized eggs then develop into complex organisms of skin, bone, and muscle that stay alive by eating and digesting food, and that have nervous systems and senses to respond and adapt to their surroundings.

Some animals, such as dogs and cats, have been domesticated by humans and participate in the routines of our daily lives. Other animals, such as rodents or snakes, also live in close contact with humans but are often unwelcome. However, most animals live completely outside of our daily experience—deep in the ocean or high in the rain-forest canopy. These animals are what we call "wild," and this lesson, which focuses on wildlife, is about animals that live outside of domestication and without continuous human interaction.

We have the opportunity to learn about wild animals by visiting zoos and aquariums, but their captive lives offer only a glimpse (and a distorted one at that) of their lives in the wild. Although we may feel very disconnected from wild animals and their habitats, our actions often have a major impact even on far-off species, and these species are often very relevant to our lives. This lesson is about our ethical obligations to wild animals.

In this lesson, you'll be asked to consider three aspects of human interactions with wildlife: appreciation, ecology, and responsibility. You'll recognize these as the components of the Eco-Ethical Mountain. We'll explore how each affects our relationship with wildlife—the plants and animals that are not cultivated or domesticated. Three videos about people who took ethical responsibility for wild animals will help you to consider if and why we should care about wild animals and plants. The environmental activists in the videos will also highlight the ways in which human actions may threaten the existence of wildlife, while exploring the relationship between people and animals. Then you'll be challenged to think about your own personal experience with wild animals and the kind of ethical framework on which you base your actions.

Throughout our considerations of the tough issues related to wildlife, it may be helpful to remember the Eco-Ethical Mountain. It is designed to help people think about ethical problems that are linked

with ecological principles and environmental concerns. The Mountain's bottom level is appreciation, followed by ecology, and topped with responsibility.

Topic 1: Appreciation

Many people claim that we should care about animals and be conscious of how our actions can threaten wildlife around the world. These people cite numerous reasons to appreciate and value wildlife: Some appreciate wildlife for the material commodities it can provide, while others may appreciate the natural beauty of wild animals and wild places. The first video of this lesson introduces a man who possesses a deep and passionate appreciation and respect for a famously wild animal: the rhino.

Video #1: Michael Werikhe, Kenya, 1990

Michael Werikhe was an automobile mechanic who lived in Kenya. He dedicated himself to the survival of the rhinoceros. Fondly known to many as "The Rhino Man," he walked thousands of miles on several continents to educate people around the world about the plight of rhinos. Werikhe's approach is creative and his goal straightforward: To help save the animal he views as the symbol of the environment, he undertakes long walks. On these "rhino walks," Werikhe educates the people who join him and raises funds for rhino conservation programs.

Some people value rhinos only because of their horn. The horn of the rhino is worth a lot of money. In some cultures the horn is ground up to make medicine. In others, it is used to make ceremonial swords and souvenirs. Hunters secretly and illegally kill rhinos for their horns, which are sold on the black market. Illegally killing protected animals (such as rhinos) in protected areas (such as parks or wildlife preserves) is called poaching. Poaching has pushed the rhino toward extinction. While just 30 years ago there were approximately 100,000 black rhinos in Africa, now rhinos are almost extinct in several African countries including Chad, Sudan, and the Democratic Republic of Congo (formerly Zaire).

To stem the tide of poaching, Werikhe has traveled across Africa, Europe, and the United States, capturing the imagination of people wherever he goes. In 1993, Werikhe led two well-publicized walks in Taiwan, one of the biggest consumers of rhino horns in Asia. He visited many traditional medicine shops and encouraged the traditional healers and the Taiwanese government to work together to educate the public about alternatives to rhino horn powder.

On all Werikhe's walks, he accepts donations for rhino welfare. The money he raises has aided the Kenyan government in its development of large, fenced, guarded tracts of land where rhinos can breed and survive. Animals from threatened areas are transported to these sanctuaries and, for the first time in years, the rhino population is reported to be on the increase. The black rhino population is currently estimated to be just over 2,000. The southern white rhino has fared slightly better. There are thought to be 8,800 of them.

Michael Werikhe appreciates rhinos. That is, he finds that they have great value. The first question to ask then is what kind of values he holds related to rhinos. Environmental ethicists consider that there are two basic kinds of values: use value and existence value.

Use Value

When something is useful to us, we tend to appreciate it. Some of the major material benefits of animals to people include the provision of meat for food as well as skins and fur for clothing. To obtain these benefits, we often kill wild animals, raise and slaughter animals on farms, or remove something without killing the animal, such as the wool of a sheep or the feathers of a goose. Poachers consider the rhino valuable only because they can sell its horn.

Sometimes this focus on the utility of animals can lead us to think only in economic terms. We may consider how much they are worth when bought or sold, or how many people could be fed by harvesting wildlife. For example, the Kenyan government values rhinos because of the income from tourists who come to see them in the wild. Therefore, the government appreciates rhinos for the utility value of being able to gain monetary benefits from the animals' presence.

Existence Values

Something may be valued for its utility, but it may also be valued just as much or more simply because it exists. Wildlife can also be appreciated apart from its utility. For example, just knowing that rhinos roam in the wild or that dolphins swim in the oceans may seem worthwhile, even if that knowledge doesn't provide you with direct material benefits. This is called an existence value. Existence values can be powerful motivators for people to undertake actions to protect faraway species and habitats, from coral reefs and rain forests to pandas and manatees.

People also may develop an aesthetic appreciation for a species or habitat, based on an enjoyment of its natural beauty or ecological importance. As an example, many people feel strongly about protecting forested landscapes and the species that live in them, not only for the ecological benefits we derive from forests, but also because healthy forests can be beautiful places for relaxation, recreation, and enjoyment.

Valuing Rhinos

To see this range of values in practice, consider the many ways in which people relate to an animal such as a rhino. Many people admire rhinos because of their majestic appearance, unusual horns, and stately gait. After the elephant, the white rhino is the second largest land animal, and the black rhino is the third. Although rhinos can weigh up to 2,200 pounds, they can run at speeds up to 28 miles per hour! Michael Werikhe says, "If there is no hope for an animal so huge, strong, and recognizable, what hope is there for lesser animals?" For Werikhe, the rhino is a symbol of the value of all wild animals.

The hundreds of thousands of tourists per year who flock to Africa for wildlife safaris offer evidence of many people's appreciation of wild animals, such as rhinos, and wild habitats. In Kenya, tourism is

the second biggest industry (behind only agriculture). The Kenyan government estimates that 80 percent of the country's visitors are drawn by wildlife, especially the "big five": rhino, buffalo, elephant, lion, and leopard. Tourists' aesthetic appreciation of rhinos and these other popular species may lead to new ways of valuing wildlife: If money from tourism stays with Kenyan communities, then local people can also appreciate wildlife for the economic benefits it brings.

In addition, many people value rhinos for their material benefits. Rhino horn was historically used in both traditional Chinese medicine and for carved handles of ceremonial daggers worn in some Middle Eastern countries. Because of the high prices rhino horns fetched (\$5,000 to \$10,000 each), they became highly sought-after commodities. This profitable trade in rhino horn led to severe drops in the rhino population and was a major factor in placing rhinos on the endangered species list. To address this serious situation, trade in black rhino horns and other rhino products has been banned since 1977 because of an international convention called the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, pronounced *SIGH-teez*).

The first step on the Eco-Ethical Mountain is appreciation. Unless, something is appreciated—that is, unless it has value—we pay no attention to it. Therefore, we must understand the different kinds of value involved in the appreciation of something and sort them out: How does the use value of selling rhino horns compare with the existence value of seeing a majestic animal and knowing that it lives natural and free in its own world? Clearly, rhinos are important and intriguing to humans for both use and existence values.

Topic 2: Ecology

Appreciating wild species and their habitats is only the first step toward making well-informed, ethically appropriate decisions. In addition to appreciation, it's also critically important to understand how living things and their habitats are interconnected, or how they fit together and support each other's existence. Ecology, which comprises the second level of the Eco-Ethical Mountain, considers these relationships. Ecology is the scientific study of the relationships and interactions between organisms living in a common environment. Eugene Rutagarama, a Rwandan biologist, closely studied mountain gorillas, developing a deep understanding of their ecology, which, in turn, led him to take a strong ethical stance against the killing of mountain gorillas and destruction of their habitat.

Video #2: Eugene Rutagarama, Rwanda, 2001

Eugene Rutagarama, a Rwandan biologist, dedicated his life to protecting a close relative of humans: the gorilla. In the 1990s, ethnic strife between two tribal groups, the Tutsi and the Hutu, tore through Rwanda. The human suffering was incalculable. But a group of humanity's most endangered relatives—mountain gorillas—could also have been victims of the violence. Thanks to Eugene Rutagarama, the fragile mountain gorilla population survived the war.

Since the end of the war, Rutagarama has generated a plan that led to the revival of the Wildlife Agency, ensuring that the protected areas of mountain gorilla habitat were kept safe. Risking his life, he repeatedly traveled to hostile territories to deliver funds and supplies to park rangers so they could

continue their work. Today, Rutagarama works for the International Gorilla Conservation Program, rebuilding ecotourism, monitoring the mountain gorillas, and building relationships with the communities near the parks.

The Fifth Mass Extinction

One of the main topics of ecology is biodiversity, or the variety of life on Earth and the interconnections among species and their habitats. Because of the tightly woven web of life, destruction of one species may cause harm to many others that are dependent on its existence. We say a species is endangered when its population is threatened with extinction in the near future. It's important to use ecological principles to better understand how destruction of one species can affect the existence of many others.

Of the more than 10 million species that scientists believe may exist on Earth, many are currently considered endangered. For a range of reasons—from habitat loss to exploding human populations to air and water pollution—we are in the midst of an era of extinctions. From studying the fossil record and other geological indicators, scientists estimate that more than 99 percent of all species that ever existed are now extinct, which means that they are found nowhere on Earth. Many of those extinctions occurred as part of the natural process of evolution: As new species develop, others die out. This process is usually a slow one, although there are occasional moments in geologic history—such as the end of the age of the dinosaurs—when a massive number of species become extinct in a short period of time.

However, today, many scientists believe that we are experiencing another era of extinction—this one caused by human actions. Some estimates suggest that more than 20 percent of existing species may become extinct during the next 25 to 50 years if biodiversity loss continues at the current rate. For example, during the past 1,000 years, we have lost one-fifth of the world's bird species, mainly as a result of human activity. Moreover, one-third of all freshwater fish species, one-third to one-half of freshwater mollusks, and one-quarter of all mammals are in danger of extinction.

In addition to particular species, entire ecosystems are also under threat: Because rain forests contain the largest proportion of the world's species, the destruction of those areas is of particular concern. It is estimated that approximately two percent of the world's rain forests (an area roughly equivalent to the size of Switzerland) is lost each year.

While there are natural reasons that some species become extinct, much of today's biodiversity loss occurs as a result of human actions. There are many ways in which people's activities contribute to this loss. Generally speaking, most of those activities can be tied to rapid increases in human population, coupled with rising levels of consumption and increasing pressures from technology. Some of the greatest human threats to biodiversity include the destruction of natural habitats, excessive exploitation of species for commercial purposes, and introduction of species to areas where those species did not originally exist. The destruction of natural habitats is by far the most significant reason for the loss of biodiversity today, accounting for two-thirds of all species extinctions and

endangerments. In the case of the mountain gorilla, violent warfare, relocation of people, and general social disruption threaten the existence of these great animals.

Benefits of Biodiversity

When a species becomes extinct, it is obviously a bad thing for that species, which will never again walk the Earth or swim the oceans. But the extinction of certain important species, called keystone species, can also change the way that an entire ecosystem functions, endangering the many benefits and services those ecosystems may provide to people and other species. Rhinos, for example, are considered keystone species in their savanna habitats. With their large body size and heavy footfalls, they pull down and heavily graze on trees and shrubs, create trails through the forest and grasslands, and dig waterholes, among other activities. On the whole, rhinos help make the savanna more hospitable for other, less-powerful creatures.

Ecosystem services are the valuable contributions that the existence of one species provides to another. For example, bees may seem to be unimportant or even pests at times, but they provide a very important service by pollinating plants. Without bees, many plants would have no mechanism for pollination, which would lead to a drastic reduction in seeds, fruits, and agriculture. Another critical ecosystem service is decomposition—the breaking down of dead plants and animals into soil. Microorganisms, called decomposers, undertake this process, which completes the food web and recycles nutrients. Wild plants and animals—from the tiniest microorganism to the largest whale—have different roles to play in the natural world. Therefore, the destruction of a species can have unforeseen ecological consequences.

Another benefit of wild species is found in their genes. Wildlife serves as a storehouse of genetic information. Unique genetic codes represent adaptations to the biosphere: The broader the gene pool available within a species, the better able the species will be to adapt to environmental changes and withstand environmental stresses. With highly endangered populations, such as the mountain gorillas in Rwanda, the continued decline of the population leads to great concerns about the viability of the population being able to survive into the future if only a few animals are left to breed. Besides conserving genetic diversity only for its intrinsic value, there may also be utilitarian reasons for conserving a range of genetically variable species. For example, some wild plants or animals may harbor chemical compounds that can be used to treat many diseases. Today a species of beetle may not seem worth saving from extinction, but what if that beetle held the key to curing a type of cancer or fighting some disease of the future?

Topic 3: Responsibility

Climbing up the side of the Eco-Ethical Mountain, we can calculate the multitude of benefits that wildlife provides to people, add the importance of wildlife to ecosystems, and decide what our responsibility toward wild plants and animals should be. In the next video, you'll learn about Samuel LaBudde's conviction that it was his ethical responsibility to conserve an important species in the web of life: the dolphin.

Video #3: Samuel LaBudde, United States, 1991

Tuna and dolphins swim together. When the fishing industry catches tuna, which is a very valuable commodity, they also kill the accompanying dolphins. When biologist Sam LaBudde learned this, he managed to get hired as a cook on a Panamanian fishing boat. Once aboard, he secretly videotaped the dolphin slaughter. LaBudde's footage provided the first graphic evidence that tuna fishers were indiscriminately killing dolphins.

LaBudde testified before the U.S. Congress, and the footage was shown on national television, provoking outrage across the country. In the months that followed, LaBudde worked with the Earth Island Institute to launch the most successful consumer boycott in U.S. history. By spring of 1990, the three major tuna brands agreed to process only dolphin-safe tuna, resulting in a 95 percent reduction of dolphin kills.

Sam LaBudde appreciates dolphins for their existence value. Just knowing that wild dolphins exist in the oceans makes him happy, even if that knowledge doesn't provide him with direct material benefits. This is an existence value. LaBudde's belief in the existence value of wild dolphins is so strong that, when he discovered that tuna fishers were unnecessarily killing dolphins, he set out to document this "environmental and ethical disaster." LaBudde believed that the destruction of dolphins was immoral, and he undertook actions to protect them at great personal risk. He goes so far as to say that, "Species extinction represents the ultimate crime against nature and humanity."

With LaBudde in mind, consider some animals from which you derive no direct benefit, but that you appreciate knowing simply exist in the wild. Ask yourself whether you would make any effort to help animals, even at personal risk, as LaBudde did? What led him to act so selflessly? Why did he take that responsibility?

The Reasons for Taking Responsibility

People can be motivated to take responsibility for different reasons. The first is the usefulness that some thing or action brings to humans. We saw that believing in a use value was one of the reasons for appreciation. When people say something is a moral responsibility or an ethical obligation, they may mean that we should act to promote what is useful for human life. The term utilitarianism describes this idea. The ethical principle of utility requires that people act to bring the greatest amount of benefit to the greatest number of people, now and into the future. While this is a very noble ethical principle, it does not cover all of the ethical issues that people face.

The principle of utility may partially explain why Michael Werikhe, Eugene Rutagarama, and Sam LaBudde helped wildlife, as wild animals somehow contributed to their personal satisfaction. In these three cases, the existence of rhinos, gorillas, and dolphins also contributed to the economy of the countries where the species live. But there must be more to the story: After all, how much does the

existence of rhinos, dolphins, or gorillas contribute to human life, apart from being objects of curiosity and admiration?

Indeed, there is more to the story. Two other ideas support responsibility: justice and duty. Justice has to do with the distribution of burdens and benefits within a community. Duty refers to knowing what you are obliged to do for others within your community. Both of these ideas require having a working definition of what your community is—how far it extends and what it includes.

One could say that LaBudde, Werikhe, and Rutagarama expanded their definition of community to include wildlife, and decided that these animals were being treated unjustly—the species were harmed and destroyed for the benefit of humans. Rutagarama said, "I don't feel that I am saving only gorillas. I feel that I am saving my relatives." By extension, the Greek poet quoted in the dolphin video explains that killing dolphins is like killing one's own kin and therefore concludes that "the hunting of the dolphin is immoral." If we can understand that there is a community of life including humans and animals, we can begin to think about what it means to treat animals justly and have duties to protect animals.

Amidst the death and destruction of war, Eugene Rutagarama believed that working to save gorillas would send a message of hope. "After a humanitarian disaster as horrific as genocide, the common struggle to preserve something of shared value, like the natural environment, can form an ideal for people to believe in," he said. "The opportunity and obligation to protect something precious can assist the reconstruction of a devastated society."

Michael Werikhe also experienced a feeling of obligation to conserve far-away wildlife: "Our duty, [as] lovers of nature, lovers of this planet, is to make sure that the rhino does not go extinct," he declared.

Sam LaBudde realized it was his duty to help dolphins when he learned of their plight. "Once you learn how bad things are," he said, "how can you turn your back on something like the dolphin slaughter or snow leopards going extinct? Then go hang out in the mountains and pretend it's not happening? I can't do that."

The three activists profiled in the videos all decided that, more than anything else, they had a duty to protect wildlife. They felt compelled to dedicate themselves and to take risks so that some other creature would not perish.

These activists recognized that extinction is not something to treat lightly—it is the permanent loss of a living organism, and, with each additional extinction, all life on Earth becomes more impoverished. The community of life, of which we're all a part, becomes diminished. There is no cure for the loss of biodiversity, and there are no excuses we can offer to future generations.

WILDLIFE WORKSHEET

Wilderness Journal Prompts

Write a journal entry that considers the issues and questions listed below. Use the Wilderness Journal Template to record your thoughts.

1. People often talk about preserving wilderness—wild areas free of development or any other sign of human impact. Have you ever personally experienced what you would consider to be "wilderness"? If so, what was it like? What feelings did it evoke in you? (For example, did you feel scared? Free? Far from civilization? Adventurous?) If you have not experienced wilderness firsthand, what do you think it would be like, based on portrayals you may have read about in books, heard on the radio, or seen on television or in movies?
2. Was the experience you had with wilderness or wild animals a positive or negative one? Did a close encounter with a particular animal change your previous ideas about that animal? (For example, did you see a great blue heron in the wild, and find that it was much more beautiful than in photographs? Or did you see a bear, and find it to be smaller and less intimidating than you had expected?) Have you ever experienced wildlife in a zoo setting? If so, what were you able to learn about the natural history, preferred habitat, and threatened or endangered status of that animal?
3. Based on your wilderness experiences, both firsthand and through the media, do you think there is a role for wilderness? What is the value of a place that has remained completely wild, even if you could never experience it for yourself?

WILDERNESS JOURNAL TEMPLATE

What Happened?

Use this space to describe your wilderness experience. Refer to the Wilderness Journal Prompts.

How do/did I feel?

Use this space to describe how you felt about your experience. Refer to the Wilderness Journal Prompts.

What did I learn?

Use this space to write about the role of wilderness in our world. Refer to the Wilderness Journal Prompts.

WILDLIFE ACTIVITY

The Great Elephant Debate Cards

For Allowing Ivory Trade to Resume

In 1989, steeply declining elephant populations in Africa and Asia motivated the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES, pronounced *sigh-TEEZ*) to ban the trade of elephant ivory. In recent years, elephant populations in South Africa, Zimbabwe, Botswana, Zambia, and Namibia have rebounded dramatically. Local people and government officials have expressed concern about being overrun by elephants. In these areas, elephants have been known to knock down fences, trample crops, and even kill people in places where elephants and human communities live in close proximity. These countries have petitioned CITES to consider allowing the ivory trade for countries in which the elephant populations have been determined to be healthy. The measure proposed by these countries states that any funds received from ivory sales would be used to fund elephant and habitat conservation, and thus free other government funding for schools and poverty-reduction programs.

You are a representative of the countries that are in support of allowing limited, legal ivory sales. Clarify your ideas and arguments, and consider the ethical principles that underlie your position. Your job is to convince the CITES judges of your position.

Against Allowing Ivory Trade to Resume

In 1989, steeply declining elephant populations in Africa and Asia motivated the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES, pronounced *sigh-TEEZ*) to ban the trade of elephant ivory. In recent years, elephant populations have rebounded dramatically in some countries. Worldwide, the ban helped to protect elephants, severely reduce ivory prices, and facilitate enforcement of anti-poaching measures. The African countries with relatively large elephant populations, including South Africa, Zimbabwe, Botswana, Zambia, and Namibia, have petitioned CITES to reinstate the ivory trade in the countries where elephant populations are healthy. Other countries, such as Kenya, strongly oppose this measure, arguing that any revival of the ivory trade would quickly lead to rising ivory prices, make anti-poaching enforcement more complicated, and—ultimately—encourage poaching, which would again threaten populations of this keystone species.

You represent the countries and nonprofit organizations that are vehemently opposed to any ivory trade. Clarify your ideas and arguments, and consider the ethical principles that underlie your position. Your job is to convince the CITES judges of your position.



FORESTS

Background

The word "forest" evokes images of tall, green trees, soft leaves underfoot, slanting sunlight, tangled vines, and abundant wildlife. In the United States, we may think of the dense southern pine forests, the vibrant autumn oaks and maples of New England, or the towering redwoods on the Pacific coast. Distant rain forests, such as the Amazon or the Congo, bring to mind wilderness and uncharted jungles of rich biodiversity.

Many people who have never been in such places may believe they've never been in a forest. But there are urban forests as well. Street trees, parks, and green spaces provide numerous health, aesthetic, and financial benefits to city dwellers, along with providing habitat to animals and oases of shade on hot days. But even persons who live in very dry climates or very cold places, where trees are scarce, feel the influence of forests that may be very distant from them. Forests are complex ecosystems that provide numerous services and functions. They help purify the air we breathe, stabilize soils, support decomposition, and provide many other benefits to life on Earth.

Our planet's forests are threatened. They are being cut down for housing and agriculture. They are harvested for lumber. They are overused by tourists, neglected, and mismanaged. Like all other natural resources, the human use of forests must be carefully measured. This unit explores some of the values attached to forests and ethical dilemmas regarding their management.

Topic 1: Appreciation

People can appreciate forests for many reasons. The value of forests extends from the material benefits gained by logging and the ecological benefits of habitat diversity, to the spiritual benefits of awe in the presence of great trees.

Colleen McCrory has lived in the forests of Western Canada all her life. She appreciates their beauty, peacefulness, and awesome magnificence. She feels that the forest is her home. But beauty is not the only value of forests.

Video #1: Colleen McCrory, Canada, 1992

Colleen McCrory realized that the forests that surrounded her since childhood were an essential part of her community, and she felt a responsibility to protect them. She led an impassioned fight to preserve forested land in her native British Columbia. McCrory worked through legal and governmental channels to prevent logging in certain pristine and environmentally important areas,

arguing that the ecological and spiritual benefits of having healthy, intact forests outweighed the economic and material benefits that would accrue from harvesting the timber.

Material, Ecological, and Spiritual Benefits

One of the most common ways of valuing forests is linked to the material benefits they provide, particularly in the form of lumber. Trees are harvested, meaning that they are cut down to achieve the material benefits of timber, which includes wood that is milled into boards. People throughout the world depend on lumber to construct homes, workplaces, schools, and hospitals, as well as to build the furniture that fills our living spaces.

The production of paper is also a primary reason forests are logged. Nearly half of all trees harvested are turned into paper and 90 percent of the world's paper comes from wood pulp. The average person in the United States uses more than 700 pounds of paper per year, and paper use is expected to continue to increase, reaching up to 1,050 pounds per person per year by 2010.

In addition to timber, people rely on many other material benefits that forests provide. Fruits, nuts, vegetables, spices, meats, oils, saps, dyes, rubber, medicines, and raw materials for traditional arts and crafts are often harvested from plants or animals found in the forest. Referred to collectively as "non-timber forest products," those items are critically important to the livelihoods of people, particularly those who live in or near forests.

Scientific research often takes place in forests. Because forests represent such rich collections of many living things, much can be learned about genetics from studying the plants and animals that live in forest habitats. Biologists and botanists search forests around the world for chemicals that may provide treatments for diseases and contribute to further understanding of ecology and the environment.

Moreover, forests provide ecological services, many of which aren't nearly as visible as material goods. Life on Earth wouldn't be possible without ecological services from forests: They help to purify our water, maintain the balance of gases in the air, prevent erosion, and harbor biodiversity.

Finally, many people value the intangible benefits of forests, finding them beautiful, peaceful, and even spiritual. For citizens of an increasingly urbanized world, forests represent much-needed places of recreation, relaxation, and escape.

Topic 2: Ecology

To understand the value of forests, it's important to understand their ecology. By studying how the elements of a forest ecosystem interact, as well as how human communities rely on forests, it becomes easier to understand the many ethical conflicts that can arise from differing views of how best to use (or not use) forests. Loir Dingit, an Indonesian tribal leader, understood this and fought to protect his country's rain forests, as well as the livelihood of his people, whose culture is intricately tied to the forest ecosystem.

Video #2: Loir Dingit, Indonesia, 1997

Loir Dingit led an effort to develop sustainable forest management practices among rattan farmers in East Kalimantan, Indonesia. Dingit, chief of the Bentian Dyak tribe, vowed to preserve traditional forestry techniques, and he joined with other tribes to make the voice of the indigenous communities heard. He firmly believes that the best stewards of Indonesia's unique rain forest ecosystem are the people who were born there and whose grandchildren will inherit the land.

Ethical arguments about the conservation and use of forests must be based in an understanding of the benefits and ecological services provided by these ecosystems. Forests cover about one-third of the land area of the planet and are found in every region of the world. While some people may think of forests simply as lots of trees, this attitude reveals a very shallow view of what forests are. A politician commented on the effort to preserve Redwood forests with the words, "If you've seen one redwood, you've seen them all." This statement represents ignorance of the complexity of forests: In reality, they are incredibly diverse ecosystems that provide habitat for an overwhelming number of species.

Forest Structure

Forests are divided vertically into three layers: the canopy, the understory, and the forest floor. The canopy is the uppermost layer, composed of branches and leaves of the largest trees, which capture sunlight and provide energy for the growth and maintenance of the tree. Below the tallest trees, the understory consists of shrubs and younger trees. The forest floor is home to smaller, shade-tolerant plants and is covered with decomposing leaves and other organic matter. Underneath the decomposing leaves, soil anchors the tree roots and provides nutrients that are absorbed through the roots, which, in turn, hold the soil in place. The roots prevent soil erosion and keep nutrient-rich topsoil from being washed away, or eroding.

Forests Around the World

Tropical rain forests are located close to the equator and at low elevations, where temperatures are usually warm and daylight length varies little. They hold very high levels of biodiversity and their soil is often poor in nutrients. Temperate forests are found in eastern North America, northeastern Asia, and central Europe, where temperatures vary greatly across four distinct seasons and leafy trees lose their leaves in the fall, enriching the soil with decaying leaf litter. Alpine and boreal forests of cold-tolerant evergreen conifers cover northern North America and Eurasia, where temperatures are very low, the growing season is short, and precipitation occurs mainly in the form of snow.

Life-Giving Forests

Forests are bastions of biodiversity—they are home to many plants, animals, and microorganisms. Although tropical forests only cover about seven percent of the Earth's land surface, they are believed

to contain more than 50 percent of the world's biodiversity. Forests also provide a number of ecological services: Through the collection, filtration, and absorption of precipitation, forests control the quality and quantity of fresh drinking water. The forest floor's spongy soil can absorb rainwater and contaminants, which are filtered as water percolates through the soil. Forests also absorb carbon dioxide (CO₂) from the atmosphere for use in plant respiration and creation of biomass, and release oxygen into the air. When burned, forests release CO₂ back into the atmosphere. The conservation of forests helps mitigate global climate change, because CO₂ is an important greenhouse gas that plays a role in regulating the Earth's climate.

When a tree falls in the forest, it opens up a gap in the canopy that allows sunlight to reach the lower levels of the forest and nourish young saplings. These saplings grow to take the fallen tree's place: this is called succession. Succession also takes place in fields from which all the trees have been removed. Trees will slowly colonize the field, with the composition of species changing over time as a result of conditions such as soil composition, rainfall, and available sunlight. Eventually the forest matures to a climax stage with old, tall trees and high biological diversity—a condition called "old growth"—if it has remained undisturbed for a long period of time. Because of this process of regeneration, trees are often considered renewable resources, and selective cutting and continuous replanting may allow a forest to renew itself on the human time scale. However, when a forest is intensively harvested for logging, or completely cleared to make way for agriculture or development, the forest may be unable to renew itself, resulting in loss of habitat and species.

A forest, then, is a community. It is not just a stand of trees; rather, it is a complex interaction of many organic elements that sustain numerous forms of life, including our own—even those of us who live far from forests. Whenever we encounter a community, we must ask ethical questions related to justice: How are the various benefits that accompany all life distributed among those who need them? These considerations should include not only the humans whose many needs are satisfied by the existence of trees, timber, and forests, but also the communities of animal and plant life that forests also make possible.

Topic 3: Responsibility

Loir Dingit stood up against governments and companies that were determined to bulldoze his people's land. Colleen McCrory spent her life savings and lost her business while fighting to protect British Columbia's forests. In a few minutes, you'll watch a video about Rodolfo Montiel Flores, who suffered imprisonment when he defended his forest-dependent subsistence lifestyle. All three of these activists made deliberate choices to save forests at great personal cost. They made an ethical choice: balancing the good of forest conservation against the harm not only to the forests but also to themselves.

Video #3: Rodolfo Montiel Flores, Mexico, 2000

Rodolfo Montiel Flores is a subsistence farmer who organized forest communities to protest logging in the state of Guerrero, Mexico, where lumber companies and local people disagreed over the values of a forest—an ethical clash that resulted in violence and even imprisonment.

Utility and Satisfaction

One of the most important reasons that forests have value is because they satisfy many human needs—aesthetically, materially, and spiritually. The ethical principle of utility recognizes the importance of fulfillment of needs. Utilitarianism is based on the idea of trying to undertake actions that create the greatest good for the greatest number of people, now and into the future. But these terms are fuzzy and difficult to define.

How can we compare satisfactions? Certainly, one person's satisfaction can be another's dissatisfaction. For example, conserving a forest can cost loggers their jobs and can decrease the profits of lumber companies. People cutting trees from forested land to create farmland may achieve the satisfaction of a better and more economically prosperous life at a cost to the environment. In these cases, the idea of the greatest satisfaction for the greatest number becomes crucial.

Utilitarianism favors actions that bring a wider range of satisfactions to the largest number of people affected. If harvesting a product from the forest could lead to a cure for cancer, then the countless lives that could be saved around the world would surely outweigh any localized impact of this exploitation. But what if lives aren't at stake? To continue with this same example, it is difficult to compare the "satisfaction" derived by a small number of people who rely on a traditional forest-based culture—whether through farming, logging, or gathering of non-timber forest products—with the provision of more widely distributed ecological services for the people living in that region or country.

Another important question when trying to determine the greatest good for the greatest number involves determining whether future generations should be included in the consideration. For example, it can be argued that, even though limitations on logging may put loggers out of work today, the continued existence of forests—for example, through sustainable harvesting practices—results in work for generations of loggers in the long run.

Utilitarian ethics may not be the perfect way to defend a decision, but ethics based on utilitarian principles are often very persuasive. Utilitarianism speaks directly to the fulfillment of human needs, and forces us to think of those satisfactions in a very broad way: the satisfaction of my own personal needs may not be as important as the satisfaction of the needs of many. Utilitarian arguments draw our attention to larger communities and wider populations. This broadened perspective is ideal for environmental issues that affect many people and communities across a broad geographical scale.

Justice and Community

The theory of utilitarianism is often helpful when we face ethical choices: How can we be assured that the greatest possible benefits come to the greater number of people? This question becomes particularly difficult when considering forest resources: Forest exploitation results in so many material benefits that it can be justified by the principle of utilitarianism—at least economically speaking. But through the lenses of community and justice, we may view these issues differently. Loir Dingit saw traditional rattan farming as more beneficial to his community than industrial logging. Rodolfo Montiel Flores and other campesinos sought a share in the profits reaped by lumber companies by constructing a tollbooth for the logging trucks. When forests are seen as a community of living things that support the life and health of many other living things, the utilitarian principle is not so clearly in favor of logging. By far, the greater number of people may reap the benefits of clean air and biodiversity if forests are preserved.

Ethical Duty

Ethical decisions are often not based on simple arguments of right versus wrong, or good versus evil. For example, members of the community in which Colleen McCrory lived supported logging because they believed it provided much-needed employment and economic sustenance to the area. Many of her neighbors relied on logging for their livelihood. In cases such as this, making a decision as to what is right and wrong becomes much more complicated. Although she recognized that many people might lose jobs if her actions were successful, McCrory was compelled by a higher principle to protect the forests: She felt that she had an ethical duty to oppose logging. McCrory was so dedicated to this cause that she even commented, "I would rather die trying than [to] not try at all."

Duty is a strong, ethical word. People who use it believe that there is a strict rule that they are obliged to obey. The rule requires that some action should be taken, even if the results may be unfavorable in terms of utility or community; the action should be taken simply because it is right. For example, many people believe that telling the truth and keeping promises are duties that should be observed even when the resulting consequences might be inconvenient, unprofitable, or even cause them harm. Colleen McCrory, Loir Dingit, and Rodolfo Montiel felt such a duty. That duty guided them through personal dangers to address what they believed to be wrong actions on the part of the government or a company.

In describing his motivation to preserve Mexico's forests, Rodolfo Montiel Flores said, "Ever since I was a child, I asked God to let me grow up and be a defender of the forests. If the forests care for us and give me life, then why shouldn't I give mine for the forest?" Flores clearly connects his need to protect the forest with his belief in a higher cause, even if it means sacrificing his own life. This sense of duty drives many successful environmental activists.

FORESTS WORKSHEET

Excerpt from

*Work, Worship, and the Natural World: A Challenge for the Land Use Professions**

by Robert Perschel

For almost fifteen years, I worked as a forester in the woods of New England. I spent long days marking timber sales. Alone. In the woods. I was there when the first snarls of snow fell out of the northern sky and softly filled up the woods. I was there when the first green shoots forced their way out of the wet mud and unfurled in a blanket of green. I was there when the first orange color etched itself on the edges of the maple leaves, and I watched the first leaves let loose their hold on life and flutter to the ground.

As a forester, you spend all day weaving your way back and forth through the hardwood forest, examining each tree in turn and deciding whether it should live or die. You repeat this each day, considering 30,000 or 40,000 trees and selecting about 300 of them to mark with a blue paint spot. Each decision involves factors such as age, size, health, soil, aspect, economic value, competition, potential growth, wildlife value, and so on. You calculate all these in your forestry-oriented brain. You raise your paint gun to deliver the death sentence, and then something unnamable crawls up from your belly and asks, "Is this the right thing to do?"; "How well does this action fit into the natural flow of the forest?"; "What harm is this causing?"; "What does this have to do with me?"; "What does this have to do with that moment on the salt marsh?"; "What is your relationship with this entity you call a tree?"; "Is this a loving act, or a purely selfish one motivated by your need and the landowner's desire to earn money?"

You squeeze the trigger, or don't squeeze the trigger, and move on to repeat the process again and again, thousands of times each day, day after day, season after season, year after year. This is work that can change you—if you open yourself to the hard questions that are about your Self: What are you as a human being, and what is your purpose, your responsibility, your role in relationship with the natural world?

If you are willing to do that, I guarantee you that each step through the forest will change you. Each difficult and complicated decision to mark a tree and alter the forest will alter you as well, but only if you are willing to bring your spirit—the essence of who you are—with you into the forest when you mark timber. Or you can choose to live your professional life, and perhaps your personal life, in accordance with the satirical prescription once voiced by comic strip author Gary Trudeau: "I am trying to cultivate a lifestyle that does not require my presence."

*Printed in *The Good in Nature and Humanity: Connecting Science, Religion, and Spirituality with the Natural World*, edited by Stephen R. Kellert and Timothy J. Farnham (2002). Island Press: Washington, DC.

FORESTS WORKSHEET

Forest for Sale

In this activity you will imagine that a piece of forested land is for sale in a nearby area. You will role-play a town meeting to determine how this land will be used. Characters will include the following:

- environmentalists who want to protect the forest area and the rare species within it
- loggers who want jobs to maintain their way of life
- corporate executives who would like to log the forest to create profits, which they argue will be reinvested in the town
- government officials who will moderate the meeting and make the final decision
- people who live in the community

To prepare for the town meeting, you will conduct research on the positions that each of the groups involved may hold. Government officials, who will listen to the arguments of all groups and then make a decision, will report on which arguments were most persuasive and why.

The Web sites listed below contain information for this activity. Use the Forests Worksheet: Forest For Sale Organizer to record information.

Sierra Club Web site
www.sierraclub.org

Wilderness Society Web site
www.wilderness.org

National Forest Protection Alliance Web site
www.forestadvocate.org

American Forest Resource Council Web site
<http://www.afrc.ws/>

Forest Resources Association Web site
www.apulpa.org

Mountain Voices Web site
<http://www.mountainvoices.org>

FORESTS WORKSHEET

Forest for Sale Decision-Making Organizer

Problem
How will the piece of forested land be used?

Characters	Proposed use for the land	Pros and Cons
Environmentalists		Pros
		Cons
Loggers		Pros
		Cons
Corporate Executives		Pros
		Cons
Community People		Pros
		Cons
Government Official's Final Decision		Reasons for Official's Decision



WATER

Background

We drink it. We wash with it. We swim in it. We get soaked when it rains on us. It makes crops grow and provides a home to billions of sea creatures. Water is our planet's most valuable natural resource. It is both abundant and precious. From space, Earth is a blue planet, with over two-thirds of its surface covered by liquid water. Water is the source of all life on Earth, and is the substance upon which all life depends. In fact, the human body is 70 percent water, and although a person could live for a month without food, one would die in less than a week without water.

Our society depends upon water in many direct and indirect ways—not just for drinking and bathing, but also for industry, agriculture, food, and recreation. Despite the importance of water in our lives, we continue to pollute and deplete our drinking water, and we disrupt and destroy marine and freshwater ecosystems.

Topic 1: Appreciation

Why do we appreciate water? This is the first question in our Eco-Ethical Mountain. The answer seems obvious: Without water we would be unable to live. Even with limited access to water, our lives would change dramatically. But to be able to make sometimes-difficult ethical decisions, we must be more specific about the value of water in our lives.

Ecosystem Services

We all need and value water for its material benefits and uses, such as drinking, cooking, cleaning, and sanitation. In many areas, rivers and lakes are used for shipping and boating, both for transportation and recreation. Functioning freshwater ecosystems also play a role in naturally controlling floods and purifying wastewater. Fresh and saltwater animals are a major source of food for the human population, accounting for one-sixth of the animal protein consumed worldwide. Fish alone represents the largest source of protein for over one billion people. Therefore, the harvesting of seafood and freshwater fish is an extremely important industry and source of jobs. These are all important use values of water.

Recreational and Spiritual Values

There are countless spiritual, emotional, and symbolic benefits of water. Water is invoked in all major religions, from fountains of youth to sacred rivers, and from biblical floods to baptism. It symbolizes purity, vastness, the all-encompassing whole, and renewal. Water metaphors are found throughout literature and art. Scientifically, water is one of the most studied and least understood materials. The chaotic swirling of flowing water, the perfect geometry of snowflakes, and the unpredictability of weather continue to baffle scientists and inspire research.

Many people love to experience water in natural settings, whether by swimming, sailing, scuba diving, or water-skiing. Water sports provide a major source of recreation for millions of people around the world. Commercial tourism on lakes, rivers, and the ocean plays a key role in many local economies.

The Power of Water

Despite the attraction of water, it can also be a source of fear. Each year, floods in the United States cause between \$2 billion and \$4 billion in damage and hundreds of deaths. To control water's unpredictable and menacing side, humans have altered the natural flow of streams and rivers through channeling, fortifying banks, and damming.

Dams, in particular, are very controversial: They generate vast quantities of emissions-free electricity, prevent the flooding of developed areas, and hold huge reservoirs of drinking water. However, many people oppose dams because they displace residents, destroy free-flowing rivers, and threaten species with extinction.

Control of water, especially by building dams, raises significant ethical problems. Does the provision of drinking water and the prevention of floods to a vast number of people justify the relocation of a minority of people from their homes or the destruction of a wild area? Are there other alternatives that result in more benefits to more people?

The first video tells the story of a Slovakian community that explored alternative options for providing drinking water to urban citizens. The people living on the Upper Torysa River valued and appreciated the river for aesthetic, as well as utilitarian, reasons and, with the guidance of hydrologist Michal Kravcik, made an ethical decision about how they would live with the unpredictability of water flows.

Video #1: Michal Kravcik, Slovakia, 1999

When Slovakia faced the challenge of providing drinking water to city residents, government officials revived a Communist-era plan to build a large dam on the Upper Torysa River. Hydrologist Michal Kravcik thought this was a bad idea—bad for the rural environment of the area and bad for the people whose villages would be flooded. Kravcik started a grassroots organization called “People and Water” to oppose the dam. He developed an alternative that used smaller dams to provide what he claimed would be the same amount of water at a fraction of the cost and with minimal impact on the environment. This democratic, decentralized plan empowered rural Slovaks, allowing them to pursue livelihoods that preserve their cultural heritage and protect the environment.

Topic 2: Ecology

People depend on water. Michal Kravcik recognized that by calling his grassroots organization “People and Water.” In the modern world, we turn the faucet to get clean drinking water—a basic service provided by public-interest utility companies. However, in Slovakia, the authorities wanted to build a

dam on the Torysa River for this purpose: to increase the water supply for their growing cities. They were emphasizing the use value of rivers, focusing only on the benefits that would accrue to city residents from having clean drinking water.

However, water is not just a resource for human consumption—it can be thought of as having independent ecological value, playing an important role in many natural processes, and serving as a habitat for aquatic organisms. Michal Kravcik appreciates this array of ecological services when he proudly describes his community's river as "the Torysa flowing clean and free." The second step in the Eco-Ethical Mountain, understanding the ecology of water, builds on the platform of appreciation and is critical in making appropriate, well-informed, ethically sound decisions.

The next video, which highlights an aquaculture project in Honduras, focuses on the ecology of water-based issues, highlighting how various parts of the ecosystem are related, dependent on each other, and affected by natural events and human activities. In Honduras, like in many other coastal communities in the tropics, the coastal marine habitat is threatened by something you might not expect: the little crustacean known as shrimp. This video explores how shrimp farms have destroyed both the coastal environment and the livelihood of Honduran fishers.

Video #2: Jorge Varela, Honduras, 1999

Along Central America's Pacific coast, the mangrove-forest habitat once supported rich wild shrimp fisheries, while also helping to protect communities from the devastating effects of hurricanes. But the privatization of coastal land and the development of industrial shrimp farms for aquaculture have cut off subsistence fishers from their traditional resources. Jorge Varela, leader of a grassroots organization composed of fishers, farmers, salt extractors, children, and other coastal residents, has worked to limit the expansion of the shrimp farm industry and create wildlife and fishing refuges to protect important coastal lagoons.

The Water Cycle

The hydrologic cycle is the manner in which water continuously moves through the biosphere. Heat from the sun causes surface freshwater and saltwater to evaporate and gaseous water to be released from plants through a process known as transpiration. This water vapor rises in the atmosphere until it reaches a level where it condenses into clouds, and eventually falls back to the ground as precipitation (such as rain, snow, hail, and sleet).

Depending on the conditions and climate of the location where this precipitation falls, a certain percentage is intercepted by plants, some percolates down to replenish groundwater aquifers, some immediately evaporates back into the atmosphere, and the rest is known as runoff. Runoff flows downhill, forming streams and creeks, joining major rivers as they run to the ocean, carving the surface of the land, and transporting loads of sediment as they go. Humans already tap half of this runoff for household, industrial, and irrigation use.

Aquatic Webs of Life

In the oceans, plankton—small organisms carried by ocean currents—forms the foundation of the food web. The marine food web is complex, comprised of interconnected plants and other organisms that eat and are eaten by one another. Emanating throughout the food web are innumerable species of plants and animals, including varieties of fish, crustaceans, and marine mammals. These animals live within unique ecosystems that exist along the coasts, in the deep-ocean water, and on the ocean floor.

Freshwater ecosystems—such as rivers, streams, marshes, and ponds—occur in the context of a watershed, which is the total land area drained by a major channel and its tributaries. Watersheds form natural boundaries in the landscape, delineating ecosystems at a large scale. Ridges, hillsides, and mountain peaks divide one watershed from the next, as they control the direction in which water flows. Any changes to the flow or purity of water in a watershed may have widespread effects downstream on ecosystems and their inhabitants.

Estuaries

Where freshwater meets saltwater—in the tidal zone between the land and the sea—is a unique ecosystem known as an estuary. In the tropics, coastal varieties of trees and shrubs, known as mangroves, grow in soil that is almost permanently waterlogged and nearly as salty as the ocean.

Mangroves create a particularly important ecosystem as they retain river sediments, control coastal erosion, serve as nurseries to many marine animals, and protect coral reefs. Coral reefs, in turn, support nearly one million species of plants and animals, provide an accessible area for fishing, and help protect coastlines from damage by breaking powerful waves during storms. As discussed in the video, Varela clearly understood the ecological importance of the coral reef and mangrove ecosystems, which spurred him to take ethically-motivated actions to conserve his area's unique biodiversity resources.

Topic 3: Responsibility

The principle of responsibility sits at the top of the Eco-Ethical Mountain. The third video tells the story of Hirofumi Yamashita, a man who, like the subjects of the other videos, felt responsibility to protect a marine ecosystem. He faced threats, refused bribes, and was ridiculed by the media, but did not give up in his quest to protect Japan's Isahaya Bay.

Video #3: Hirofumi Yamashita, Japan, 1998

Isahaya Bay was once one of the largest and richest tidal mudflats in Japan. However, the Japanese government didn't realize the value of this ecosystem; first, they planned to drain the wetlands to create farmland, and then they proposed to build a wall across the bay for flood protection. Hirofumi Yamashita felt that these plans were misguided and ignored the human and ecological communities

of the coast. Despite the strong opposition led by Yamashita, the government went ahead with construction of the sea wall in 1997.

Watershed Communities

Watersheds and bodies of water define plant, animal, and human communities. What exactly does the word community mean in this context? Groups of wildlife interact to form ecological communities, linked by the food and energy webs. Similarly, people form communities. We band together based on some commonality, such as, for example, a shared language, history, or religion. A school is a type of community, as is a neighborhood or town. Natural resources can also define the boundaries of a community.

Devising ways to use and share water ties people together in communities, perhaps more distinctly than the use of any other resource. Water is a common resource that must be distributed among various users for different purposes, often in the face of a limited supply. Water has historically been essential to the development of communities, as illustrated by the fact that the four oldest civilizations developed in the fertile floodplains along rivers: Mesopotamia developed between the Tigris and Euphrates Rivers; Harrapan on the Indus; Egypt on the Nile; and China on the Yangtze and Yellow Rivers. The floodplains—vast flat areas of rich topsoil—accumulated as these rivers laid down their sediment loads while they approached the sea. Such flat areas, rich in nutrients from the river, served as ideal spots for agriculture.

Today, all people living within a river's watershed can be thought of as members of the same community, as these aquatic arteries tie together all people who live in the drainage basin. This connection is most obvious during times of flood—when all suffer the effects of a rising river—or drought—when scarce river resources must be allocated among many different uses. For these reasons, proper management of water resources always requires a regional, watershed perspective. The popular environmental slogan, "Everybody lives downstream," captures this notion of watershed communities. Without a community-wide perspective, water users closest to the source (upstream) may take a large portion of the water for their agricultural or industrial purposes, leaving little for those living further from the source, or lacking the economic and political resources to fight for their share of the water. Even if the upstream users don't physically remove water, they may pollute water sources, limiting the utility of the water for other users.

Hirofumi Yamashita saw Isahaya Bay as a community. It was a community made up of the people who lived around the water and harvested food from it. The bay also represented a community of aquatic creatures that made it their home.

Threats to Water Resources

Because we use and appreciate water and water systems in so many different ways, human use of water can lead to its overuse and, in some cases, destruction. For example, groundwater (which is water found underground) is the source of 20 percent of the water that humans use. If pumped out of the ground at a sustainable rate, groundwater is a renewable resource, with aquifers slowly but

constantly recharging through the hydrologic cycle. However, if we draw the water too fast, we deplete the aquifer, leading to groundwater overdrafting. Groundwater overdrafting represents a situation in which we are sacrificing the integrity of the long-term system to meet immediate needs.

A similar problem is found in the Earth's oceans, where over-fishing is said to threaten more than one-quarter of all fish stocks. It is believed that almost half of all fish stocks are harvested at a maximum renewable amount (called the maximum sustainable yield), and thus are vulnerable to depletion if the level of fishing increases.

A final major threat to groundwater, surface water, and the oceans is pollution. From acid rain to oil spills, toxic chemical pollutants sometimes kill plants and animals in marine and freshwater ecosystems, and poison drinking and recreational waters.

Responsibility

According to the ethical principle of utility, we want to maximize good things for as many people as possible. Water to drink and fish for people to eat are clearly good things. The Slovakian authorities wanted to increase the supply of drinking water; the Honduran shrimp companies wanted to market desirable food. However, the resources in our world are not limitless, and we often don't know the maximum amount of a resource we can harvest until we have gone too far and started to destroy it. A cautious approach to utility, one that considers the happiness of future generations, would surely be less likely to overdraft, over-fish, or pollute.

Often, the negative impacts of an environmental problem only affect a small group of people, while the larger population reaps the benefits. This situation can be justified by the ethical principle of utility, which aims to produce the greatest amount of good for the greatest number of people. But what if you were from one of the four 700-year-old villages that would have been flooded by the planned dam in Slovakia? Do you think you would have supported the dam or Kravcik's alternate plan? Although the actions that lead to some environmental problems are often justified by utilitarianism, they may still be unacceptable to members of the harmed community, who expect costs and benefits to be justly distributed.

Responsibility for the local environment, which represents the peak of the Eco-Ethical Mountain, is clearly something that each of the Goldman Award winners takes seriously.

Jorge Varela stood up against shrimp farmers to protect mangroves and local fishers. Michal Kravcik fought government officials bent on building a dam and offered a "blue alternative." Hirofumi Yamashita warned of the environmental impacts of flood control and dedicated his life to measuring the impact of this flawed project. He felt particularly devoted to preserving the coastal ecosystem because it had been his lifelong home and companion—from when he was a boy digging in the tidal mud to when he was conducting important scientific research on Isahaya Bay's ecology.

All three of these conservationists recognized that we depend on water and aquatic systems. They felt ethically driven to protect this communal resource. They took this responsibility because they realized the fundamental, life-giving nature of water: Water shapes the Earth and shapes our lives. They each

clearly saw that water creates communities of life. In every community, benefits must be distributed so that all parts can live and flourish. Though self-interest is an important part of each of us, ethical responsibility for the environment moves us beyond self-interest and utility. The environment and those who reside within it form a community of life where maintaining the health of each part is indispensable for maintaining the health and integrity of the others.

WATER WORKSHEET

K-W-L Chart

In this lesson on water, you are going to complete a K-W-L Chart on the topic of water. The K-W-L Chart is a tool that will help you reflect on what you know about a topic, what you want to know, and what you have learned. The "K" stands for what you already know about a topic. The "W" portion of the K-W-L Chart focuses on what you want to learn more about.

The "L" portion, which stands for what you have learned, is completed after you have viewed the videos and participated in the lesson activities. The purpose of completing the final section of the chart is to help you reflect on, synthesize, and summarize what you have learned throughout the lesson activities.

K WHAT I KNOW	W WHAT I WANT TO KNOW	L WHAT I LEARNED

Was the total amount on your chart more or less water than you expected to use in one day? Why or why not?

Do you think you could use less water, or find ways to use water more efficiently? If yes, in what ways? If not, why not?

WATER WORKSHEET

Seafood Sleuthing

Gather the following information about your selected seafood species:

What's it called?

Seafood name:

Scientific name:

Where's it from?

Natural geographic distribution:

Source of this seafood in your community:

Tell me about it.

Population in the wild:

Lifespan:

Interesting biological facts:

Role in ecosystem (What eats it? What does it eat? Is it involved in any symbiotic relationships?):

Catching it

Amount of annual catch (in terms of money and numbers of fish):

Sustainable yield or fishing limits (if determined):

Number of fishers employed catching it:

Number of subsistence fishers (people who catch only to eat, not sell):

How it is caught (What kind of boats and nets? How do they find it?):

Environmental impacts of harvesting:

Buying and eating it

Price per pound (How does this compare to other types of seafood? Is it affordable?):

How far it travels to get to your plate:

Nutritional value or health impacts:

Attach a map of geographic distribution and a picture of your seafood species to this worksheet.



AIR

Background

Air—a unique mixture of gases—surrounds the Earth and supports all life. The atmosphere serves as both a shield and a blanket, protecting us from meteorites and cancer-causing radiation, while trapping heat from the sun. The composition of the air in the atmosphere is maintained by cycles of gasses through the biosphere, a complex set of interactions between living and non-living things. The resulting atmosphere is responsible for climate, or the regular patterns of weather, including the temperature, rainfall, and wind.

Polluting the air changes the atmosphere and can threaten human health and, potentially, change the entire climate of our planet. Climate change represents perhaps the greatest environmental problem that current and future generations will ever face. Scientists believe that our planet's changing climate will lead to more frequent occurrences of severe weather events (such as hurricanes, floods, and droughts), as well as to warming in certain parts of the globe and cooling in others. Fortunately, many people, like the subjects of the videos in this lesson, are already working to protect the air we breathe.

This lesson will concentrate on air pollution. Pollution is caused when toxic chemicals are added to the air in amounts that compromise human health. The chemicals are produced when we consume resources such as oil, coal, and gas for energy and when we manufacture products such as plastics, rubber, and heavy metals.

In this lesson you will be completing a Double Entry Journal. A Double Entry Journal is an interactive note-taking tool that gives you an opportunity to make comments, record comments, clarify and understand ideas, and raise challenges about what you are reading.

The Double Entry Journal format is a piece of paper divided into two columns. The first column is where you take notes on what you are reading or viewing. The second column of the Double Entry Journal is where you add your own thoughts and responses. Your Student Workbook contains a template for your Double Entry Journal.

You should use the Double Entry Journal when your teacher gives you an assignment in your Student Workbook on the topic of air. After you have finished the lesson activities, return to your Double Entry Journals and review your thoughts. Think about how your ideas have changed throughout the lesson activities.

Topic 1: Appreciation

We often don't think about air—the invisible gases surrounding us—until it becomes a problem. For example, we tend to worry about the quality of air only when we begin to see and smell it as smog. We also may become alarmed when we see the destructive effects of air pollution on human-made objects, such as buildings and statues. For example, corrosive gases can speed the process of decay by eating away and discoloring stone and cement. This effect confronted M.C. Mehta, a public interest lawyer in India, who took up a campaign to reform his country's practically-nonexistent, pollution-control laws, spurred by his concerns about the destruction of the Taj Mahal.

Video #1: M.C. Mehta, India, 1996

M.C. Mehta, a public-interest lawyer, recognized how air pollution was destroying the Taj Mahal—one of India's cultural and architectural treasures. Mehta started a movement not only to protect this great wonder, but also to attack his country's monumental problems of air pollution. Hundreds of polluting factories have either been closed down or have installed pollution control devices thanks to Mehta's tireless work. He has also taken on water pollution and habitat destruction cases, and is one of the most successful environmental lawyers in the world.

Air: The Medium of Life

Even though we may occasionally take air for granted, we all appreciate clean air. And like M.C. Mehta, the ways we appreciate air range from the obvious—such as valuing the air we breathe—to the subtle—such as enjoying a cool summer breeze. Air is the medium of our existence. Without air, leaves would not flutter and seeds would not be dispersed in the wind. Without air, there would be no sound, as the vibration of air molecules carries the waves of sound. In the silent vacuum of space, no sounds are heard—no language, no music, no words of love or anger. Of course, talking about a world without air is like talking about an ocean without water. Without the atmosphere, the Earth itself would be a cold and lifeless entity.

Air has inspired research, poetry, and literature. Air can be comforting—a gentle breeze off the ocean or the aroma of a home-cooked meal. But air can also be menacing, such as winds whipped into the awesome power of tornadoes and hurricanes. Wind has played a role in every major religion, from God speaking of the whirlwind in the Old Testament, to the Mayan god Hurukan, the origin of the name for our most powerful of storms. Wind reminds us of the deities themselves, something we cannot see directly but can perceive through its actions, an invisible force manifested in our lives and environment.

Wind Power

Humans have harnessed the power of wind, propelling navigation and exploration of the seas and the colonization of distant lands. Sailing remains an important form of recreation and sport. On land, wind has been harnessed to turn the blades of windmills, to grind grain and pump water. Today, wind

is increasingly recognized as an important source of clean, renewable energy. Modern technology has further allowed humans to take to the skies. Airplanes enable us to fly like birds, and flight has revolutionized travel, commerce, and war. In fact, in just 100 years since the first powered flight, Americans now take some 650 million flights annually.

Industrial Production and Air Quality

Air is an important tool in the disposal of wastes and byproducts of modern industrial society. Since the beginning of the industrial revolution in the mid-1800s, smokestacks rising from factories and power plants have released smoke and other pollutants into the atmosphere. Although these pollutants seem to disappear, they actually spread throughout the atmosphere. The release of smoke or other gases into the air can also be the result of natural events such as volcanoes and forest fires. Both human and natural sources of air pollution at small concentrations do not pose a problem, as the atmosphere can absorb and assimilate those pollutants. But once atmospheric pollution reaches certain levels, the pollutants become destructive and sometimes even deadly.

It is vitally important to determine how harmful a particular source of air pollution may be, what technology is available to minimize or mitigate the related problems, or where industrial or power plants that cause air pollution can be safely located. These are challenges of both science and ethics, a matter of fully appreciating the many ways humans and other life forms benefit from the atmosphere.

Sometimes we can recognize that an action is ethically right when it produces the greatest amount of benefit or satisfaction for the greatest number of people over the longest period of time. This is the ethical principle of utility, which favors actions that, on balance, produce the greatest satisfaction to, and value for, the largest number of people affected. In making this determination, we need to consider economic and material consequences of our uses of the atmosphere, as well as the many other ways the air affects our health, our culture, and our quality of life. We must consider not only our own satisfaction but also that of many others, and the various ways the atmosphere is important to humans and the broader natural environment.

Topic 2: Ecology

Understanding the science of the atmosphere helps us to make better technical and ethical decisions about the problem of air pollution.

What Is Air?

Although seemingly uniform, the air around us is composed of a slowly changing mixture of gases. The two primary gases in the atmosphere are nitrogen and oxygen, which respectively account for 78 percent and 21 percent of the volume of the atmosphere. The remaining one percent of the atmosphere is composed of a large variety of gases, some of which remain relatively constant over time, such as argon, neon, helium, and hydrogen, and others that are variable, such as water vapor, carbon dioxide, methane, nitrous oxide, and ozone. At a local level, the air may also contain a variety of manmade additions, especially in urban and industrial areas. While the air should have no natural

negative effect on humans, certain toxic chemicals can get in the atmosphere and cause great harm. In Louisiana, where Margie Eugene-Richard grew up, the high levels of cancer had given the region the nickname "Cancer Alley," and this was all because of pollution in the air.

Video #2: Margie Eugene-Richard, United States, 2004

For residents of a tiny Louisiana town sandwiched between a chemical plant and an oil refinery, breathing the air could be deadly. After watching neighbors and family members contract rare diseases, and witnessing explosions at the plant that poured millions of pounds of toxic chemicals into the air, Margie Eugene-Richard became an activist dedicated to cleaning up her neighborhood and holding the polluting companies responsible for their actions. For minority groups who bear a disproportional amount of the social costs of environmental problems, Richard is an environmental justice hero.

Airy Concerns: The Ozone Hole

The atmosphere contains some of the world's most pressing environmental issues, such as the ozone hole, climate change, acid rain, and smog. All of these problems, like the industrial pollution that Margie Eugene-Richard fought, are a result of the complex chemical processes that take place in the atmosphere. For example, ozone (O₃) is a gas mostly found high in the stratosphere—the layer of the atmosphere from 8 to 30 miles above the ground—where it absorbs the sun's ultraviolet radiation, which can be harmful to humans and other life on Earth.

In the 1970s, scientists discovered that the ozone layer was being destroyed by chlorine escaping from human-made compounds called chlorofluorocarbons (CFCs), which were used in refrigeration, air conditioners, and aerosols. That discovery was later confirmed when significantly decreased levels of ozone were found over the Earth's poles, particularly Antarctica. This "ozone hole" has the potential to cause skin cancer and eye damage in humans, as well as other damage to animals and plants. Fortunately, through laws and international treaties, the production of CFCs has dropped dramatically, and the ozone hole has decreased over time.

Climate Change and the Greenhouse Effect

The atmosphere also acts as a blanket, trapping the energy and heat from the sun. This process is called the greenhouse effect, and is largely the result of what are called greenhouse gases such as water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Without the greenhouse effect, the temperature at the surface of the Earth would be average 59.4°F (33°C) colder, below the freezing point of water. Life as we know it would not exist.

However, the concentration of too many greenhouse gases in the atmosphere can be a problem, and these concentrations are currently on the rise because of various human industrial activities. For example, CO₂ levels in the atmosphere have increased by 30 percent since pre-industrial times, mainly due to the burning of fossil fuels such as coal, oil, and natural gas. Large increases in atmospheric CO₂

and other greenhouse gases could affect global climate and weather patterns. Indeed, many scientists predict that, unless we reduce the industrial production of greenhouse gases, the Earth will grow substantially warmer. While this change may benefit some species and agricultural systems, overall, it is likely to decrease biodiversity, raise the sea level, and threaten human health through the spread of disease.

Acid Rain and Smog

Increased acidity in the atmosphere, called acid rain, occurs when air pollution from coal power, industry, and automobiles contaminates precipitation with sulfuric and nitric acid. Acid rain is a regional problem, with the contaminated rainwater sometimes being deposited hundreds of miles from the source of the pollution.

By contrast, smog is a local air problem occurring in most large cities. Smog is primarily caused by automobile and industrial exhaust, which includes carbon monoxide, nitrogen oxides, and reactive hydrocarbons. Smog forms when sunlight hits these gases and forms ozone (a deadly pollutant at the ground level, despite being a vitally important block of ultraviolet radiation in the stratosphere). Smog is frequently seen as a haze hanging over many urban areas, and can cause nose and throat irritation, breathing difficulty, headaches, and—in extreme cases—even death.

A Healthy Environment

Because humans, as well as other living creatures, depend on a healthy atmosphere for our survival, the protection of the air emphasizes the ethical principle of preserving the community of life. We cannot live together unless we work to create, sustain, and preserve our access to a clean and healthy atmosphere. By joining forces to protect the atmosphere, especially when it is threatened, we reinforce our commitment to one another, our communities, and the nonhuman world.

Topic 3: Responsibility

In our third video, we will learn about an ordinary housewife who felt an extraordinary responsibility to prevent the air in her community from being polluted. Terri Swearingen was not motivated by the threat a toxic waste incinerator posed to her health, but rather it was the health of her daughter and future generations that motivated her to action.

Video #3: Terri Swearingen, United States, 1997

When Terri Swearingen found out that a toxic waste incinerator was being planned for her community, she was very concerned. Although company officials claimed that the only thing that would come out of the smokestacks would be puffs of water vapor, she feared that this facility would pose a health threat to the neighboring homes, the closest being only 300 feet from the plant, and an elementary school that was only 1000 feet away. Swearingen organized local citizens, led protests, exposed the illegal permits that allowed the plant to be built, and successfully pressured the federal government to make stricter regulations on waste incinerators.

M.C. Mehta was appalled by the Taj Mahal being eaten away by the side effects of industry. Margie Eugene-Richard witnessed her neighbors and family members suffer the health impacts of polluted air. Terri Swearingen feared the impact of toxic waste incineration to the health of nearby children. Polluted air results from the enormous industrial and technological activities that make modern life possible and provide livelihoods for millions of people. But air pollution can be so severe and intolerable that people like Mehta, Richard, and Swearingen feel a duty to eliminate it despite the immediate economic and social disadvantages that may sometimes result.

The three activists were motivated by a profound sense of responsibility to protect individual life, their communities, and the environment. They felt a sense of duty to do something about their local environmental problems. This feeling of duty and responsibility motivated them to take action, even if the results were viewed by some as unfavorable. They felt actions were required simply because it was the right thing to do. They believed this duty should be observed even if it is inconvenient and unprofitable to others.

Duty versus Utility

How does the ethical principle of duty differ from utility? The ethical principle of duty is strict. It does not allow for comparing and balancing satisfactions in the way that the utilitarian ethical principle does. Even when it allows for some exceptions in serious cases, it demands obedience. Certain kinds of ethical problems seem to involve duty even more than utility. For example, if obeying the law was only ethical because it satisfied needs and satisfactions for the greatest number, it would be easy to see that many would argue that their personal—or even country's—satisfaction was of a greater need than the rights of individuals or communities as a whole.

The ethical problems associated with air quality are a good example of the principle of duty. Our atmosphere surrounds and supports all life. Climate, fertility, and the health of all living things depend on the atmosphere. Some individuals or even large groups may obtain substantial benefits from causing air pollution that other individuals and communities experience as harmful. The notion of duty offers us an ethical principle large enough to guide our thinking about protecting the atmosphere under all circumstances.

Duty as an ethical idea requires a master rule. Philosopher Immanuel Kant stated such a rule for ethical duties between humans: "Act toward others as ends in themselves and not merely as means to fulfill your purposes." The Golden Rule, found in all religious traditions, states a similar duty: "Do unto others as you would have them do unto you." Aldo Leopold, one of the founders of the environmental movement in the United States, proposed a master rule for environmental ethics: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." Using this rule, we can see that whether fighting against industrial air pollution, auto emissions, or toxic waste, choices should always include the total and long-range impact on the life of people, animals, vegetation, and the entire physical world that depends on the atmosphere.

A Healthy Environment

Because humans, as well as other living creatures, depend on a healthy atmosphere for survival, the protection of the air emphasizes the ethical principle of justice as preserving the community of life. Preserving the human community requires justice: Each part of the community, person, animal, or natural substance must share in the goods that make life possible. Since industry produces products and wealth that improve the quality of life, we must find ways to safeguard our atmosphere while, at the same time, make the activities that support modern economic life possible. Industry must be an active participant in environmental justice. As our Goldman Award winners show, industry can be engaged in this task, but it often requires great effort and commitment on the part of active citizens. We cannot live together unless we work to create, sustain, and preserve our access to a clean and healthy atmosphere. By joining forces to protect the atmosphere, we reinforce our commitment to one another, our communities, and to the nonhuman world.

AIR WORKSHEET

The Double Entry Journal

Facts and Information

My Thoughts, Reactions, Comments

AIR WORKSHEET

Individuals Count

Use the tables below to track the amount of energy you use in one week for transportation and electricity. You'll then calculate how much your personal energy use may affect the atmosphere.

Transportation

To figure out how much gasoline you use to get around, you'll need to keep track of the miles you travel on a car, bus, train, or plane. If you use a car, note the year, make, and model of the car so you can calculate the average miles per gallon by using the website www.fueleconomy.gov. If you use public transportation, you'll need to be creative in your accounting, using maps (or the website www.mapquest.com) to figure out the length of your trip, as well as doing some research to find out the miles per gallon. Also, don't forget to keep track of how many people shared the car or bus with you.

<i>Where did you go?</i>	<i>Initial mileage</i>	<i>End mileage</i>	<i>Total miles</i>	<i>Type of vehicle</i>	<i>MPG for vehicle</i>	<i>Total gas (divide miles by MPG)</i>	<i>Number of people in vehicle</i>	<i>Individual gas (divide gas by # of people)</i>
<i>Total gas you used in one week:</i>								

To find out how much CO₂ results from your transportation choices, complete the following calculation:

_____ (gallons of gasoline) x 19 (pounds of CO₂ per gallon gas) = _____ pounds of CO₂

Electricity

You will need a copy of your latest electricity bill to compute your personal home energy use. Look on the bill for the number of kilowatt-hours consumed. You will also need to find out how your local utility produces power. To do this, check on the Internet or call the company to see if your local power plant uses coal, oil, natural gas, nuclear, hydro, wind, or solar power. Consult the chart below to find out how much CO₂ results from each kilowatt-hour of power.

<i>Pounds of CO₂ per kilowatt-hour</i>	<i>Coal</i>	<i>Oil</i>	<i>Natural gas</i>	<i>Nuclear</i>	<i>Hydropower</i>	<i>Wind</i>	<i>Solar</i>
	2	1.7	1	0	0	0	0

Fill out the following calculations to compute CO₂ created by your electricity use every month:

_____ (kilowatt-hours) / _____ of days in billing period x 7 days/week = _____ kilowatt-hours per week

_____ (kilowatt-hours per week) / _____ of people in family = _____ individual kilowatt-hours per week

_____ (kilowatt-hours per week) x _____ pounds CO₂ per kilowatt-hour = _____ pounds of CO₂

Bring your calculations to class. Combine the figures to determine how much energy was used both in the home and for transportation. Then answer the following questions: In your area, how is energy created (e.g., coal, wind, nuclear, or hydropower)? How is energy usage, both within a house and for transportation, tied to air quality? How do car, bus, and train travel contribute to compromised air quality? What kinds of new technologies are being used to reduce this impact?

Total CO₂ emissions in a week: _____ (transportation) + _____ (electricity) = _____ pounds of CO₂

You may wish to visit the following websites to learn how you can make changes that will reduce your energy consumption. Some examples include the following:

The U.S. Department of Energy

http://www.eere.energy.gov/consumerinfo/energy_savers/intro.html

The State of New Hampshire's Governor's Office of Energy and Community Services

<http://nh.gov/oep/programs/energy/ReducingHomeEnergyCosts.htm>

Colorado State University Extension

<http://www.ext.colostate.edu/pubs/columncc/cc011113.html>

AIR WORKSHEET

Considering the Ethical Principle of “Duty”

Excerpt from: “The Land Ethic”* by Aldo Leopold

All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in that community, but his ethics prompt him also to co-operate (perhaps in order that there may be a place to compete for).

The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.

This sounds simple: do we not already sing our love for and obligation to the land of the free and the home of the brave? Yes, but just what and who do we love? Certainly not the soil, which we are sending helter-skelter downriver. Certainly not the waters, which we assume have no function except to turn turbines, float barges, and carry off sewage. Certainly not the plants, of which we exterminate whole communities without batting an eye. Certainly not the animals, of which we have already extirpated many of the largest and most beautiful species. A land ethic, of course, cannot prevent the alteration, management, and use of these “resources,” but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.

In short, a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.

In human history, we have learned (I hope) that the conqueror role is eventually self-defeating. Why? Because it is implicit in such a role that the conqueror knows, ex cathedra, just what makes the community clock tick, and just what and who is valuable, and what and who is worth-less, in community life. It always turns out that he knows neither, and this is why his conquests eventually defeat themselves.

*Published in *The Sand County Almanac* by Aldo Leopold, 1948.

Write a short essay reacting to the above excerpt using the following questions to guide your writing:

- Do you agree with Aldo Leopold’s description of the land ethic? Why or why not?
- Do you feel a duty to the ecological community? Why or why not?
- Describe any actions that you feel a duty to do in your life. (These actions should not be motivated by personal satisfaction or the utilitarian satisfaction of the greatest good.)
- Do you feel any duty with respect to the natural environment? Why or why not?



MINERALS

Background

Modern life would be unrecognizable without the non-living resources we extract from the Earth that power and shape our lives. Imagine a world with no cars, airplanes, or trains; no bridges, tall buildings, or gas stations. This world without mineral resources would have no ice cubes, no central heating or air-conditioning, no stereos, no television, no Internet.

Life as we know it depends on the minerals and energy resources we extract from the Earth. However, the use of all these mineral resources carries a special concern because—unlike trees, fish, and other living resources—mineral resources are largely not renewable. Thus, we are restricted to the mineral reserves that we already know about or that we might discover, which makes the conservation of mineral resources through reuse, recycling, efficiency, and substitution so important. In addition, the use of mineral resources comes with costs that are sometimes devastating to local ecosystems and human communities, as the activities related to mining and processing can release toxic chemicals into the air, soil, and water; damage the local landscape; and seriously alter natural habitats.

Video #1: Jonathon Solomon, Sarah James, and Norma Kassi, United States and Canada, 2002

The Arctic National Wildlife Refuge provides one of the best-known backdrops for controversies related to the use and conservation of mineral resources. The debate over drilling for oil in northeast Alaska has raged for decades. Many argue that the small amount of petroleum resources available does not justify the great environmental and social impacts that will disproportionately affect the local wildlife and Native American tribes. Solomon, James, and Kassi are native Gwich'in activists, who are working to ensure that their homeland is protected for generations to come.

Topic 1: Appreciation

Historical Importance

Minerals have been valuable throughout human history. In fact, the Stone, Bronze, and Iron Ages—stages of the development of human society—are even named after mineral resources. During the Stone Age (which began about two million years ago in Europe, Asia, and Africa), people crushed colorful minerals to use for decoration. However, when people discovered that green and blue copper-containing ores could not be crushed into a powder, but could be bent and polished, they began to fashion those ores into jewelry. The discovery that copper could be combined with tin to make bronze, which holds a better edge and is more malleable, led to the creation of new tools such as sickles, which increased the efficiency of settled agriculture.

Societies in Asia, Europe, and Africa later discovered that iron could be heated and then hammered into shape, creating sharper knives that were less prone to bending. The superior characteristics of iron made it the metal of choice—a preference that continues today as iron is used to make the steel for cars, ships, and buildings.

Precious metals and gemstones have also been revered throughout history for their rarity and beauty. Among people's most treasured possessions, precious metals and gems are believed to hold curative powers, ward off danger, and contribute to the well-being of their owners. Unique characteristics, such as rarity and resistance to corrosion, make gold, platinum, and diamonds traditional symbols of constancy, fidelity, and devotion, as illustrated by their use in wedding rings.

Minerals in Today's World

Modern uses of minerals have multiplied far beyond sickles and jewelry to include every aspect of modern life. Computers are kept humming by silica, copper, zinc, iron, aluminum, and lead, as well as plastics made from petroleum. Salt flavors our foods, clears snowy streets, helps produce paper, and softens hard water. Gold can be found in electronics equipment, dentistry, reflective coatings on glass, and even in treatments for arthritis.¹ Silver is widely used in photographic film, as well as in electronics, pharmaceuticals, mirrors, and batteries.² Industrial diamonds act as abrasives and cutting tools. Over a lifetime, it is estimated that each American uses:

- 800 pounds of lead, primarily in batteries, radiation shields for x-ray equipment, and television screens, as well as in fine china, crystal, cell phones, and microwave ovens
- 750 pounds of zinc, as a rust inhibitor for steel on buildings, bridges, cars, trains, and ships
- 1,500 pounds of copper for copper wire used to conduct electricity
- 3,600 pounds of aluminum in cans, aircraft, automobiles, sporting goods, electronic equipment, and appliances
- 32,000 pounds of iron in cars, subways, ships, construction, power transmission, and appliances³

Clearly, we all benefit from the use of mineral resources and, therefore, appreciate them on a variety of levels, even if their use is not obvious at first glance. It is important to recognize that these mineral resources are extracted from ecosystems around the globe, adding to our appreciation of those environments.

For example, Sarah James, Jonathon Solomon, and Norma Kassi appreciate the riches of their land in many ways, including the fact that their people are able to survive from the resource provided by it. James says, "We've got timber, we've got water, we've got tourism...and we've got oil and minerals. But (the oil and mineral industries) are taking it out as fast as they can..." James, Solomon and Kassi know that the minerals beneath the tundra are very valuable and that others want access to those resources. At the same time, the native people appreciate other benefits from their environment.

¹ Kesler, Stephen E., *Mineral Resources, Economics, and the Environment*, (New York: Macmillan College Publishing Company, Inc., 1994), Page 236.

² Kesler, 248.

³ "Rock and Mineral Uses," <http://www.rocksandminerals.com/uses.htm>. Accessed 7/5/03.

James describes a spiritual and emotional connection to the place. "We are caribou people," she says, "Creator put us (here) to take care of (this) part of the world." The conflicting values—extraction of minerals versus spiritual identity—poses the great ethical problem: is beauty and meaning to those who live there sufficient reason to deny others use of the land to extract useful products?

Monetary Measures of Minerals

One way of measuring the amount that people appreciate or value something is by investigating how much they would be willing to pay for it. Utilitarian decisions are often expressed in monetary terms. Using a monetary measurement, the value of minerals is huge. The production of energy resources (such as oil, coal, and natural gas) adds \$700 billion annually to the world economy, while the production of metals adds another \$500 billion annually.⁴

But this production also entails social and environmental costs. You probably have not thought much about the 1,500 pounds of copper you will use in your lifetime and wondered where this copper originated. Would you want the copper you use to have been mined from a beautiful, tropical island? Atherton Martin stood up against a planned copper mine on the Caribbean island of Dominica, making arguments about the importance of considering long-term environmental and social impacts of projects.

Video #2: Atherton Martin, Dominica, 1998

Atherton Martin protested the building of a copper mine on the small, eastern Caribbean island of Dominica. Through convincing arguments about the visible and invisible social and environmental costs, he was able to persuade the mining company, as well as the local community, to more realistically consider the benefits and drawbacks of the proposed project. Martin continues to develop projects that provide economic benefits to the island's residents, while also conserving resources and protecting the environment.

Topic 2: Ecology

Mineral Make-Up

To understand the science behind minerals, a basic background in geology is helpful. Mineral deposits are distributed unevenly around the globe, as a result of worldwide geologic processes, which control the minerals' formation and deposition. The Earth is made up of a hot, central iron core; a thick mantle of slowly moving solid and semi-solid rock around the core; and a crust of solid, brittle rock that underlies oceans and covers continents. The crust and strong upper layer of the mantle are divided into a dozen major (and a few smaller) tectonic plates that move over the lower, more fluid mantle. Along the boundaries of tectonic plates, some of the richest deposits of metallic ore are found.

⁴ Kesler, p. 6.

Minerals are compounds and elements that constantly cycle through the Earth's crust and mantle. They are hidden in rocks, which are naturally occurring solids containing one or more minerals. In the rock cycle, igneous rocks are formed when magma (molten rock) flows up from the upper mantle through volcanoes or fractures in the crust and cools. Sedimentary rocks are created when little bits of weathered rock accumulate and are compacted and solidified. Metamorphic rocks are created when sedimentary and igneous rocks are subjected to intense heat and pressure.

Energy resources actually began as living things: Petroleum and natural gas were, at one time, animals and plants that lived in the seas hundreds of millions of years ago, and coal began as ancient swamps. Covered by sediments, these organic materials did not decompose in a normal way, but rather the oxygen-less conditions of high temperature and pressure resulted in carbon-rich material that can be burned to release large amounts of energy.

Mineral Mining

Mining of these resources is a difficult, expensive process, and can be very disruptive to both the environment and human communities. With surface mining, the overburden—which includes the rocks, soil, and trees that cover the mineral of interest—must be removed. If not managed properly, this overburden may fill up valleys and clog creeks, altering the landscape. As a result of mining practices, dust and toxic substances may be carried into the air, while toxins also seep into creeks, rivers, and groundwater. Subsurface mining has less severe effects on the landscape, but it is more expensive and is a more dangerous process for the miners. Subsurface mining hazards include collapses that trap and kill miners, underground explosions of dust and natural gas, underground fires that cannot be put out, and prolonged inhalation of mining dust, which causes lung diseases.

Once mined, metal ores must be processed to remove waste materials, known as tailings, which can also be dangerous pollutants. Smelting of metals to chemically separate the metal from the ore mineral releases gases and dust including sulfur dioxide, which contributes to acid rain. And the environmental impacts don't end with processing: Most products made from metals and other mineral resources end up in landfills, which can contaminate groundwater and surface water. The burning of fossil fuels releases various forms of air pollution, contributing to climate change, acid rain, and urban smog. The transport of energy resources is also fraught with danger, as oil spills can poison large areas, while natural gas pipelines have the potential to cause hugely destructive explosions.

Video #3: Jacqui Katona and Yvonne Margarula, Australia, 1999

When a uranium mine threatened Kakadu National Park—one of only 20 World Heritage Sites with cultural and natural significance—Katona and Margarula leapt into action. These Aboriginal women mounted a massive opposition campaign to prevent development of the mine, which would severely impact upon their traditional lands and destroy the fragile ecosystem. Katona and Margarula have raised public awareness on this issue and, through leveraging intense protest and anti-mining sentiment, have succeeded in delaying the building of the mine.

Topic 3: Responsibility

Jonathon Solomon, Sarah James, and Norma Kassi opposed oil drilling in Alaska. Atherton Martin prevented copper mining that would have threatened a pristine rain forest ecosystem. Jacqui Katona and Yvonne Margarula fought to protect their people and land from uranium mining. While each of these individuals recognized the utility of extracting minerals and the economic benefits derived from these activities, they believed that the burdens of those activities fell unfairly upon their communities. This represents the inequities addressed through environmental justice.

Justice for All

The mining, transporting, processing, and disposing of minerals carries social and environmental costs. But often a small group of people bears the burden, while the larger population benefits, which represents what is called an issue of environmental justice. The ethical principle of justice refers to the obligation to assure that the benefits and burdens of social life are fairly distributed among all people.

Justice has long been defined as "giving to each according to their due," meaning that what is due to each person should be determined by her or his contribution as well as what she or he deserves and needs. For example, it is considered fair to compensate a person who has worked very hard to build a house rather than someone who occasionally contributes labor. Or it is considered to be fair to give a prize to the winner of the race, rather than to someone who claims the prize because they have trained harder, even though they lost. It is considered fair to give more attention to a student who, though intelligent, has not had educational advantages, rather than to others who come from more privileged backgrounds. However, it is much more difficult to decide what is just and fair when various parties all have some claim on the goods to be distributed.

Duty: Imaginary People in an Imaginary World

In the section on "Air," a master rule for duty was discussed. What kind of master rule could serve as a guide with respect to justice? The philosopher John Rawls argued that the rules governing the fair distribution of the burdens and benefits of life in society would best be decided by imaginary people in an imaginary situation: They would make the rules "behind a veil of ignorance." It may seem a little strange to have imaginary people making the rules, but Rawls thought it was important that the rule-makers should not consider their own role or place in society, so as not to bias their decision. The imaginary decision makers would not know whether the people involved would be smart or limited, privileged or deprived, weak or strong, male or female, white, black, or brown. Each person would then enter the real world and have to live their lives according to these pre-made rules. Rawls hypothesized that the rules that these imaginary people would make would be something like this:

- All options would be open to all people.
- Any inequalities in the system of rights and privileges are just only if they result in compensating benefits for the least advantaged in the system.
- If a situation breaks these hypothetical rules, then it can be considered unjust.⁵

⁵ Rawls, John. 1999. *Theory of Justice*. Belknap Press: Cambridge, MA. Chapters.1 and 3.

While Rawls presents a simple, articulate definition of justice, many would disagree with these rules, contending that the fairest method of distributing resources is by supporting capitalist institutions that take into account property rights as well as the rights that accompany a discovery or invention (intellectual property). Clearly, defining what is just is very complex but most people recognize the importance of asking questions such as: How can mineral resources—so necessary for modern life—be managed so that their undeniable benefits flow not only to the well-positioned but also to the least-advantaged?

Minerals for the Future

Another important concern with regard to non-renewable mineral resources is what happens to those who live after the resources have been exhausted. Existing reserves of copper, silver, lead, and zinc are expected to last less than 30 years, while reserves of oil, nickel, and tin may last 30 to 50 years.⁶ New discoveries or markets may expand these timeframes, but does our generation have the right to exhaust resources that are also necessary for the existence of future generations?

Deciding on how the costs and benefits of mineral resources should be justly distributed represents a complex ethical and environmental challenge. To share the benefits of minerals with indigenous people or minorities may mean compensating them monetarily, or prospecting for resources in a manner that does not threaten subsistence lifestyles.

However, the people whose actions are highlighted in the Goldman Prize videos are unlikely to agree on monetary compensation or compromise with a big corporation. They are fighting for something much more valuable than money, something that cannot just be divided equally or redistributed. Jonathon Solomon, Sarah James, Norma Kassi, Jacqui Katona, and Yvonne Margarula are fighting for their cultures. Their traditions—handed down by their ancestors—are fundamental to their personal identities as well as to the identity of their communities. These activists are bound by a duty to protect the cultures of their people. Cultures, like species, can become extinct, as language and traditions slowly fade into the past under the homogenizing force of modernization. As a duty to their ancestors and their children, indigenous people are often driven to protect their environment and culture.

The Future Is Now

To keep from running out of resources, and to limit the environmental and social impacts of mineral mining, there are actions that people can take now to help conserve resources for the future. One of the best-known conservation mantras is "reduce, reuse, recycle" (the Three R's).

The first goal is to reduce your use of resources—whether that means driving less, using less electricity, or buying fewer material things. The second goal is to reuse what you already have—reusing a plastic water bottle, for example, instead of buying a new bottle of water everyday. Finally, the third goal is to separate and recycle plastics, metals, and paper. Actions such as these can help to

⁶ John E. Tilton, *Depletion and the Long-run Availability of Mineral Commodities*, (England: International Institute for Environment and Development (IIED) and World Business Council for Sustainable Development (WBCSD), 2002) p. 53. Available at www.iied.org/mmsd/mmsd_pdfs/tilton_complete.pdf

conserve resources for the future and—following the principle of justice—help to ensure that we leave mineral resources for the benefit of future generations.

MINERAL ACTIVITY

Enviro-Mines: The Wave of the Future?

Many people are concerned with the social and environmental impacts of mining, and many groups are working to make mining a cleaner, safer, and healthier practice for people and wildlife alike. Undertake a research project to find out about the companies, governments, and nonprofit organizations working on developing practices and procedures to clean up the act of some of the dirtiest mines.

Conduct research to find out about the companies, governments, and nonprofit organizations working on developing practices and procedures to clean up the act of some of the dirtiest mines. Focus particularly on the social concerns voiced by the organizations working to find alternative processes and products, and explore how the principle of environmental justice is driving many of these efforts.

Visit the Mining Certification Evaluation Project's website at: www.minerals.csiro.au/sd/SD_MCEP.htm. Consider the following questions:

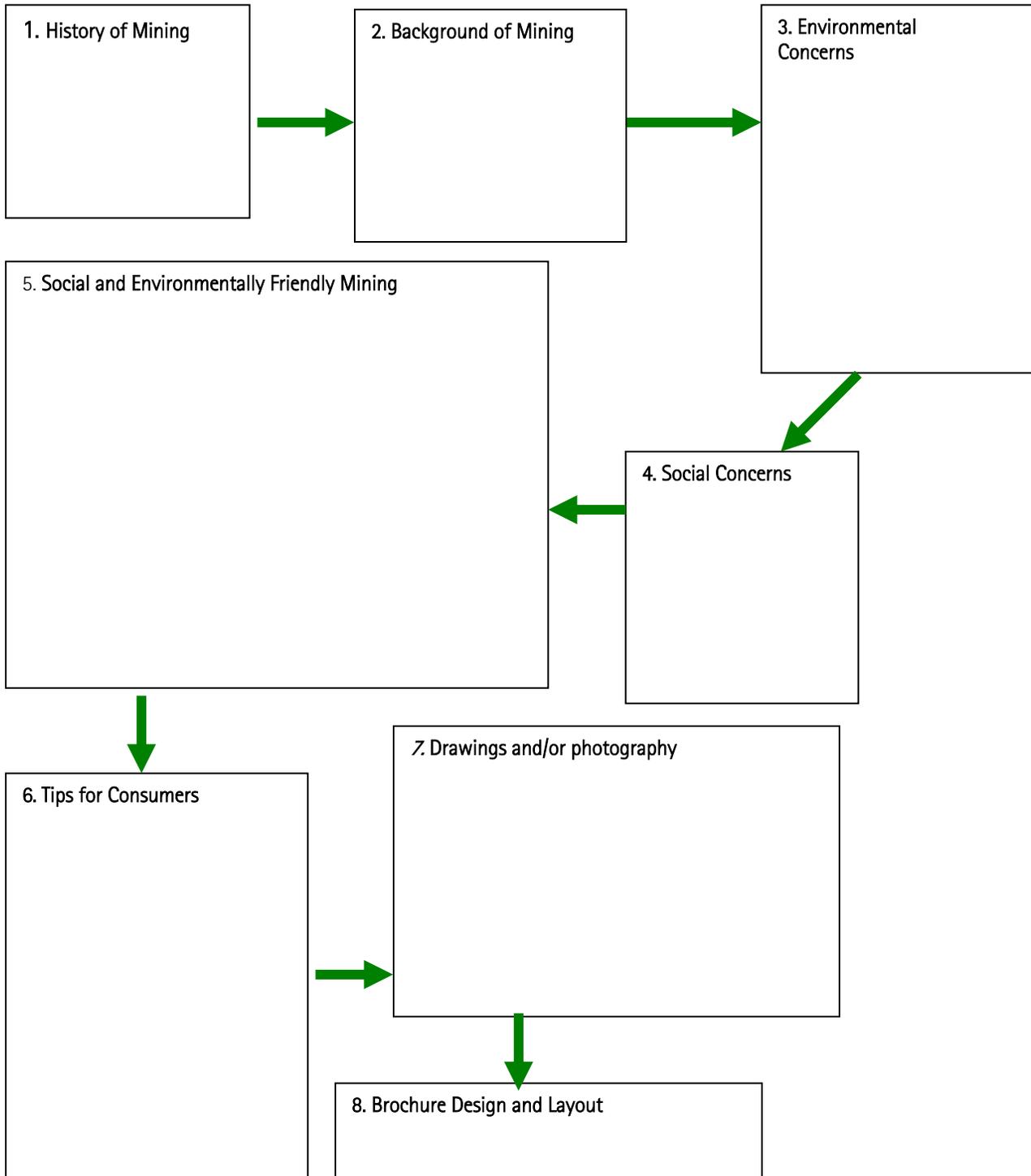
- What is the goal of this project?
- How is this project concerned with environmental ethics and social justice?

Visit the recommended links from this page, and search the websites of the sponsor organizations to gain insight into the types of groups working on these efforts and their successes, as well as failures, to date.

Use the Mineral Worksheet: Storyboard Template to organize your information. You are going to create a colorful and informative brochure that discusses the history and background of mining, the environmental and social concerns related to it, and the efforts being made to pursue socially and environmentally friendly mining. Include tips on ways for consumers to make more responsible choices with regard to consumption, recycling, and reusing of mineral-intensive products, such as mobile phones, televisions, and batteries.

MINERAL WORKSHEET

Story-Board Template





CONCLUSION: THINKING LIKE A MOUNTAIN

Background

The video profiles throughout this Workbook have highlighted the work of a few of the Goldman Environmental Prize winners. Each of these brave and imaginative leaders expressed their ethical obligation to protect and respect nature. Each possessed an understanding of various threats to the natural environment where they lived. Each was committed to sustaining the environment because they had a strong ethical commitment to the land and its creatures, as well as to current and future generations. These prize-winners believed that the actions they undertook were right and good.

Topic 1: Review of Basic Ideas

The six previous lessons have developed an understanding of the natural world through examining the human relationship with the environment. They have demonstrated how and why people possess an ethical commitment to protect air, water, forests, wildlife, and minerals.

Appreciation, Ecology, and Responsibility

Each person's willingness to sustain the natural environment depends on understanding many things that are related in complex ways. We must appreciate the natural world's myriad values and benefits, and learn how the parts of the world are related to each other and to us. We should nurture a deep ethical conviction that the natural world deserves our respect and our protection, and we should learn how to carry those convictions into action. The Goldman Environmental Prize winners demonstrate how ordinary people who are committed to protecting the natural environment can take extraordinary actions simply because they believed those actions were the right things to do.

The Eco-Ethical Mountain (presented in the introductory lesson and referred to throughout the lessons) shows how these complex ideas can be put together. It leads our thinking from personal feelings to scientific facts and then to ethical principles. The mountain can be used to guide our ethical understanding of why we should protect air, water, forests, wildlife, and minerals.

The natural world and the human relationship to it form the base of the mountain. The first level – appreciation—describes the ways that people value and benefit from nature, whether wild plants or animals, air or water, minerals or geological forms. These and other natural features provide essential material comforts and securities, as well as beauty and emotional connection, intellectual and physical challenge, and even spiritual and moral inspiration. The second level—ecology—stresses the importance of an objective understanding of the natural environment based on careful scientific study. And the third level—responsibility—addresses how basic moral values—duty, utility, and justice—guide people to take actions that manage, regulate, and control natural features and resources in ways that respect the natural world and use it justly for human benefit.

Ethical Principles: Utility, Justice, and Duty

Responsibility, found at the peak of the Eco-Ethical Mountain, is comprised of three basic moral ideas: utility, justice, and duty. First, a broad appreciation of nature's value leads to the utilitarian principle of the long-term interests of people being best served by sustaining the natural environment. Second, an objective understanding of the natural environment leads to the principle of justice, which emphasizes the right of all people to have access to a healthy and productive natural world. Finally, possessing the knowledge of how to care for the environment leads to the principle of duty or the obligation to take action to ensure that the natural world is protected for people today as well as for future generations.

Topic 2: An Ecological Community

An ethical commitment to protecting the environment develops from an understanding that people are an integral part of nature—humans are members of a larger, interrelated community of air, water, soils, plants, and other animals. The great ecologist and environmental philosopher, Aldo Leopold, described this sense of community by saying:

All ethics so evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. [An environmental] ethic enlarges the boundaries of community to include soils, waters, plants, or collectively: the land. . . A land ethic changes the role of Homo sapiens from conqueror of the land community to plain member and citizen of it. It implies respect for [its] fellow-members, and also respect for the community as such.

This perspective helps us appreciate how people are bound with other living organisms and with the non-living properties of air, water, and soil in a great cycle of flowing, interchanging energies and materials. Nature, rather than being remote and apart from humans, is, in fact, essential to people's physical and mental health. By recognizing that people are a part of and dependent on the natural environment, feelings of personal and emotional connection to the natural world arise. As Aldo Leopold suggests, we become "ethical only in relation to something we can see, feel, understand, love, and otherwise have faith in."

Shifting Views of Nature

Aldo Leopold was one of the first thinkers to voice these opinions during the early part of the 20th century. Like others at that time, Leopold barely recognized human's dependence on the natural environment, focusing instead on exploiting and controlling nature to the greatest extent possible. Leopold was a young forester who worked in the mountain wilderness of New Mexico and actively participated in eliminating wolves. He was simply following the conventional belief of the time that the eradication of this animal would result in a safer and better place for cattle, people, and deer.

He radically changed his mind after shooting a wolf and watching the "fierce green fire dying in her eyes." His changing beliefs were subsequently strengthened after bearing witness to the uncontrolled explosion of deer and cattle populations that eventually resulted in the destruction of the surrounding

landscape. Through these experiences, Leopold came to appreciate how wolves, predators, and all native plants and animals contribute to the health and productivity of the land. He recognized that an environmental action "is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

Thinking Like a Mountain

Leopold came to view any ecosystem—like a mountain—less as a random collection of dead rocks and soil disconnected from the surrounding plants and animals, and more as living and non-living materials bound together in a mutually dependent flow of energy and resources. Leopold called this ecological and ethical understanding "thinking like a mountain." The image of the mountain also reminds us that, like any mountain, the mountain's peak is only as strong and secure as its base.

The lessons of this curriculum have taught us that protecting the natural environment depends on good science, technology, and law, as well as on a deep ethical respect and obligation. We have learned that human lives of meaning and value depend on the health and productivity of the air, water, forests, wildlife, soils, and minerals. We have come to appreciate that much of human industry, intellect, emotion, and even spirit originates in the natural world. Like Aldo Leopold, we have come to recognize that the foundation of environmental conservation is a deep ethical respect for the natural world. As he concluded:

There must be some force behind conservation, more universal than profit, less awkward than government, less ephemeral than sport, something that reaches into all times and places . . . something that brackets everything from rivers to raindrops, from whales to hummingbirds, from land-estates to window-boxes. . . . I can see only one such force: a respect for [nature] as an organism; a voluntary decency in [environmental] use exercised by every citizen . . . out of love for and obligation to that great biota.

These lessons on environmental ethics began with a young American woman, Kory Johnson, who took responsibility to organize the people of her city in Arizona. She and her group, Children for a Safe Environment, stopped a toxic waste dump from being built. This course ends with Yosepha Alomang, an old woman from a far-away place, the island of West Papua New Guinea. Yosepha Alomang and Kory Johnson are very different in age, culture, and language. However, they both recognize that the natural environment and the human community are profoundly related. To harm one is to harm the other, regardless of the profits that might derive from exploitation and resource overuse. Alomang and Johnson share the same sense of responsibility to act on behalf of the environment and on behalf of the people who depend on the environment today as well as those who will depend on it in the future.

Video: Yosepha Alomang, Indonesia, 2001

In West Papua, the Amongmai tribe lives a sustainable existence in the tropical rain forest, which is one of the most biologically rich ecosystems on the planet. However, for the past three decades, gold mining in the region has resulted in deforestation, polluted rivers, and displaced communities. Yosepha Alomang, a local matriarch known as Mama Yosepha, fought to prevent the world's largest gold-mining corporation from destroying the sacred mountain under which her people live, and the forests and streams around it. Because she stood up for her community, she was treated like a criminal, but, still, she continues to fight.

Topic 3: Our Common Responsibility

The story of Mama Yosepha illustrates all of the principles of environmental ethics. Mama Yosepha appreciates the mountain. She and her people describe it as sacred and hold it in awe. She says that they wake up in the morning and see it there. It is valuable just because it is there. It has been there for all of their ancestors and should be there for their children. But she also appreciates its use value. She knows that, without the Mountain, the water would not flow to the sea and would not nourish the land where food grows and animals live. Tearing the mountain apart would lead to floods sweeping away gardens and villages. So Mama Yosepha can also give a utilitarian argument against the miners: destroy the mountain and you destroy our life.

The miners and the government can argue back. They can claim that profits from the gold mining will enrich many other people in addition to the Amongmai. The government declares that the mine is essential to Indonesia because it will bring welfare to many people. Thus, Mama Yosepha needs another, stronger argument.

One argument is justice. Why should a mining company benefit while the Amongmai suffer? They have lived in the forest for countless generations: The forest is their land and the land of their ancestors. But now the land and the Amongmai's livelihood are being destroyed because gold is valuable in a faraway place. Isn't it unjust that the Amongmai should pay the price for the satisfaction of other people's needs and desires and profits?

Mama Yosepha also assumed responsibility to save the land because of duty: She is the matriarch of her people, so she felt a mother's sense of duty to care for the lives, health, and welfare of the Amongmai people. She realized that her maternal duty extended not only to men, women, and children but also to the physical world in which her people live. In fact, she says, "the land is like a mother from sea to mountain. The water is like a mother's milk." The land, like a mother, cares for its children and provides them with the necessities of life. So those who dwell in it must respond by protecting it from harm.

Mama Yosepha knows that her responsibility doesn't end with the Amongmai people; rather, her community extends to the world of mountains, forests, rivers, and ocean that surrounds her people

and their homeland. In justice, the health of each of these must be attained together, because each alone cannot exist. She has been willing to be imprisoned and tortured so that the good of the land and the people can be upheld. The mountain is not just one part of the landscape. It is the life-giving center of all that lies around it. If the mountain could think, it would ask what it can do to nourish and protect the land and the people around it. In the words and story of this woman from a far-away place, we can learn the whole of environmental ethics.

Mama Yosepha really does "think like a mountain." She explains, "The top of my head is peeled off. My breasts are dried up, my milk gone." In these poetic words, she describes how the top of the mountain has been peeled away and the streams that had flowed down its sides no longer nourish the land. The mountain is so personal to her and so meaningful to her people that she feels its destruction in herself. Each one of us should also "think like a mountain" when we learn that our environment is threatened by human carelessness or selfishness: we should feel it in ourselves, as if it is we who are threatened—because we are.

In these seven lessons, you have met people from around the world, like Mama Yosepha, who care deeply about protecting the environment. These people are driven by a deep sense of ethical responsibility: They think it is wrong to destroy the environment, and they have done what they thought was right, despite great opposition and hardship. You have also explored different environmental issues surrounding the natural resources of wildlife, forests, water, air, and minerals. In each case, a holistic perspective on the issue was built on the framework of the Eco-Ethical Mountain: appreciation, ecology, and responsibility. It's become clear that ethics isn't easy, as there are many perspectives on what's right and wrong and many sides to each controversy. Once you've developed a multifaceted understanding of and appreciation for each of these issues, ultimately only you can decide what you think is right.

We hope you will carry the Eco-Ethical Mountain with you as a tool to think deeply about the environmental decisions you confront every day, and that by "thinking like a mountain," you'll be able to apply these lessons to your own community and your local environment.

CONCLUSION WORKSHEET

Wetland Wonderland Organizer

Record information from your field trip in the organizer; use the information to write your editorial.

What Did I Do?

Use this space to describe what you did on your field trip.

What Did I Learn?

Use this space to explain what you learned on the field trip.

How I Can Use This Information?

Use this space to record ideas on how you can use the information that you learned.

GLOSSARY

Acid Rain. rain or other precipitation that is acidic due to air pollution. Acids are sour liquids (think lemon juice) that corrode or break down the rock in statues and buildings and can have a negative impact on the health of humans and ecosystems.

Air. the mix of invisible, odorless and tasteless gases that surround the Earth.

Alpine Forest. the type of forest found in high elevations and latitudes, characterized by small, shrub-like evergreens due to harsh weather and poor soil conditions.

Appreciation. in ordinary language, "appreciation" means having a favorable opinion of someone or something. In this course, it is used in a special way: to know and understand the reasons why something is valuable.

Atmosphere. the layer of gases above the surface of the Earth that makes life possible by regulating temperature, cycling nutrients, and protecting us from meteorites.

Boreal Forest. a type of forest found in northern regions of North America and Eurasia, which is dominated by conifers, or evergreen trees that have needles and cones.

Campesino. in Spanish-speaking countries, a farmer, farm worker, someone who lives in a rural area.

Canopy. the uppermost level in a forest, where one finds the tops of leafy branches.

CITES. this stands for the Convention on the International Trade in Endangered Species of Wild Fauna and Flora, an international treaty that regulates which plant and animal products can legally be bought and sold.

Climate Change. the disruption of the Earth's climate, or regular weather patterns. Although climate has changed naturally over thousands of years (for example, the Ice Ages), scientists have concluded that pollution caused by humans is currently increasing the greenhouse effect and threatening to dramatically change our planet's climate.

Community. in ordinary language, a group of people living together. In ethics, the common interests and values that hold people together and encourage them to communicate and cooperate in sustaining the conditions of life.

Duty. an action that a person is obliged or required to do because of some ethical or legal rule or principle and can be blamed for failing to do.

Ecological Services. the services that intact natural ecosystems provide to humans, such as providing clean air and water, food, and protection from extreme weather.

Ecology. the science that studies the relationships, connections, and interactions that occur among various parts of the environment.

Endangered. a term that refers to a species of animals that has a very small population and is in danger of going extinct.

Environment. the physical and biological elements that surround and make possible the complexity of organic life.

Environmental Ethics. the study of how general principles and values apply to deciding what choices should be made to guide human interaction with the natural environment, particularly when protection and preservation of nature are in conflict with human uses of natural resources.

Erosion. the process by which wind, water and glaciers slowly wear away rock and soil. Erosion is a natural process, but in areas of deforestation erosion can be more extreme and destructive, especially along riverbanks and coastlines.

Ethical Conflict. since there are many ethical values and principles, occasionally one set of principles may seem to require actions and choices that are different from those required by other principles. This leads to disagreement that is grounded in people's basic beliefs. One purpose of ethics is to attempt to explore these basic beliefs, to reconcile these apparent differences or to show which set of principles ought to prevail.

Ethics. in ordinary language, the values and principles that people use to guide their actions and behavior. In a more special sense, ethics means the study of reasons for right and wrong actions: that is, the study of how values and principles can be known and how they should be applied in deciding what actions are right.

Extinction. when a species of life completely dies off.

Genetic Diversity. the variety of genes within a population or species.

Greenhouse Effect. the natural process that regulates the Earth's temperature, in which greenhouse gases in the atmosphere trap heat from the sun.

Greenhouse Gases. a handful of gases, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), that play a role in the greenhouse effect. The amount of greenhouse gases in the atmosphere has increased dramatically due to human activity, which has increased the surface temperature of the earth and may lead to further climate change.

Groundwater. water found in underground reservoirs, which we tap through wells and springs.

Groundwater Overdrafting. occurs when groundwater is removed faster than reserves are naturally replenished.

Hydrologic Cycle. the natural process by which water changes state and moves through the environment. The cycle includes evaporation, when water changes from a liquid to a gas and enters the atmosphere; condensation, when water changes from a gas to a liquid and falls from the sky as rain; freezing, when liquid water turns to ice; and melting, when ice turns back to liquid water.

Invertebrates. the large category of animals that do not have internal skeletons made of bone, but rather have a shell, or exoskeleton, or no firm structure or protective layer. Invertebrates include insects, spiders, worms, and snails.

Justice. the ethical principle that concerns the ways in which the goods of society are distributed to the participants in that society in a fair way: that is, in relation to their achievements, needs and contributions. **Intergenerational Justice** refers to the ways in which one generation ought to foresee and provide for the needs of other generations that will follow it and whom they will not personally ever know.

Keystone Species. certain plants or animals that play an important role in their ecosystem, whose decline can have disproportionate negative impacts on the environment and other species.

Mangroves. a type of forest found along the coast in tropical areas. Mangroves have a high tolerance of salt and fresh water, and control coastal erosion and protect coastal communities from adverse weather.

Mineral Resources. non-living resources that have accumulated through natural processes and are often found underground, including metals and gems.

Mining. the process of extracting minerals from underground, which often entails negative environmental and social impacts.

Over-fishing. removing for human consumption more fish, or other ocean and freshwater resources, than can be naturally replaced through reproduction. Over time, over-fishing decreases the population of a species, pushing it towards extinction. This also has negative consequences for the human communities that depend upon the species for their food or livelihood.

Ozone Hole. a decrease in ozone (O₃) in the high atmosphere caused by human pollution. The ozone layer protects the Earth's surface from dangerous ultra-violet (UV) radiation from the sun, and the thinning of this layer over the North and South poles has resulted in a "hole" through which more cancer-causing UV rays reach the planet.

Plankton. tiny organisms found in oceans and freshwater that float with the currents and are the foundation of the food web for marine and freshwater ecosystems. Phytoplankton refers to all the plant-like plankton which create their food from the sun's energy, and zooplankton are the animal-like plankton that feed primarily on phytoplankton, and themselves are food for larger organisms, such as small fish and whales.

Pollution. the wastes and side-effects of human industry and transportation systems that are released into the air and water and contaminate these resources, often with negative impacts on the health of humans and ecosystems.

Rain Forest. a type of forest found in areas with high precipitation and moisture levels. Tropical rain forests house a continuous canopy of leafy, evergreen trees and a large percentage of the world's biodiversity. Tropical rain forests, which are primarily found in developing countries, are threatened by deforestation due to the rapid conversion to farm and pastureland. Temperate rain forests are found in the Pacific Northwest and Southeast Alaska, where one finds some of the last old-growth stands of trees in North America.

Responsibility. the various duties and obligations that accompany certain roles, such as parents, teachers, citizens and, in a broader sense, as human beings living in a community. Responsibility can be based on **Duty** or on **Utility** or on **Justice**, as well as other moral principles. Responsibility also refers to the ability to act in a voluntary way and to be accountable for one's actions.

Smog. poor air quality in urban areas that results from either the combination of smoke and fog, or the chemical interaction of a soup of pollution emitted by cars and power plants reacting to ultra-violet radiation from the sun.

Tailings. the by-products of mining and processing minerals, often highly toxic, which pollute water bodies around mining sites.

Temperate Forest. a type of forest found in regions that experience four seasons of relatively mild weather and high rainfall. Temperate forests spread across much of the contiguous United States, and house a mix of leafy deciduous trees, which lose their leaves in fall and winter, and conifers, which have evergreen needles year-round.

Topsoil. the fertile surface layer of soil, which is made up of a high-level of organic material, and is threatened by erosion in areas of disturbance. Most of the roots of plants are found in the rich topsoil. Farmers also depend upon a healthy layer of topsoil in which to plant their crops.

Understory. the lower level of a forest, between the canopy and ground, where one finds small trees and shrubs.

Utilitarianism. one form of ethical theory that maintains that a choice or action is right only insofar as it aims at **achieving utility**. This theory is expressed in the Principle of Utility: "An action is ethical insofar as it contributes to the greater good or happiness of the greater number of people." In a broader sense, Utilitarianism means choosing to act in ways that improve human well-being and happiness.

Utility. in ordinary language, usefulness, the ability of something to serve some purpose. In ethics, the final goal or objective that people seek to obtain by their actions, usually called the "Good" and usually thought of as a happy or satisfied life.

Value. that which makes something attractive or desirable, the object of appreciation. Value is usually distinguished as either **Intrinsic** or **Instrumental**. **Intrinsic Value** means that something is good in itself, not only for what it can achieve; **Instrumental** means that something has value only in relation to what it can achieve. So, money has only instrumental value; happiness is an intrinsic value because it is good in itself. **Existence value**, as used in this course, means the same as **Intrinsic** value, that is, valuable in itself and not for what it can produce. **Use** value, as used in this course, means the same as **Instrumental** value.

Watershed. a geographic area that shares the same water resources due to the features of the landscape, which is best illustrated by a valley in which all the streams and rivers flow downhill and into a larger body of water. Any activities that pollute or otherwise impact the water resource upstream affect those living downstream, connecting people in a watershed community.

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