

1 The Environment as an Ethical Question

1.1 Nature and the environment

What is the environment? In one sense the answer is obvious. The environment is those special places that we are concerned to protect: the Arctic National Wildlife Refuge in Alaska, the Great Barrier Reef in Australia, and the Lake District in the United Kingdom. But the environment is more than these special places. It is also Harlem and Brixton, as well as the Upper East Side of Manhattan and the leafy suburbs of Melbourne. It is even the strip malls of Southern California. The environment includes not just the natural environment but also the built environment.

Indeed, we can even speak of the “social environment.” The term ‘environmentalism’ was coined in 1923 to refer not to the activities of John Muir and the Sierra Club but, to the idea that human behavior is largely a product of the social and physical conditions in which a person lives and develops.¹ This view arose in opposition to the idea that a person’s behavior is primarily determined by his or her biological endowment. These environmentalists championed the “nurture” side in the “nature versus nurture” debate that raged in the social sciences for much of the twentieth century. They advocated changing people by changing society, rather than changing society by changing people.

While the scope of the environment is very broad, contemporary environmentalists are especially concerned to protect nature. Often the ideas of nature and the environment are treated as if they were equivalent, but they have quite different origins and histories. The *Oxford English Dictionary* defines

¹ John Muir (1838–1914) founded the Sierra Club in 1892 and is one of America’s greatest environmental heroes. For more about his life and work, visit https://en.wikipedia.org/wiki/John_Muir.

‘environment’ as “the objects or the region surrounding anything,” and traces its origin to an Old French term, *‘environner’*, meaning “to encircle.” The word ‘nature’ has much deeper roots, coming to us from the Latin *natura*. While disputes about the environment have occurred mostly in the twentieth century and after, arguments about the meaning and significance of nature are as ancient as philosophy.

That these terms, ‘environment’ and ‘nature’, are not identical in reference and meaning can be seen from the following examples. The *boulangerie* (bakery) on the corner of my street in Paris is part of the environment, but it would be strange to say that it is part of nature. The neurons firing in my brain are part of nature, but it would be weird to say that they are part of the environment. Finally, had the contemporary environmentalist, Bill McKibben, written a book called *The End of the Environment* instead of the book he actually wrote, *The End of Nature*, it would have had to be a quite different book.

Sorting out the reasons for these disparate uses would be good fun. Perhaps it is a necessary condition for something to be part of our environment that we think of it as subject to our causal control, while no such condition applies to what we think of as nature. So the moon, for example, is part of nature but not part of our environment. On this view the end of nature might be thought of as the beginning of the environment.²

1.2 Dualism and ambivalence

The expansiveness of the environment is reflected in the contemporary environmental movement by the concept of holism. The First Law of Ecology, according to Barry Commoner in his 1971 book, *The Closing Circle*, is that “everything is connected to everything else.” This holistic ideal resonates in the common environmentalist slogan that “humans are part of nature.” This slogan is often used to imply that the “original sin” that leads to environmental destruction is the attempt to separate ourselves from nature. We can return to a healthy relationship with nature only once we recognize that this attempt to separate ourselves is both fatuous and destructive.

The thirst for “oneness” runs throughout much environmentalist rhetoric. Indeed, one way of rebuking someone in the language of some

² For further discussion, see Sagoff 1991.

environmentalists is to call them a “dualist.”³ Dualists are those who see the world as embodying deep distinctions between, for example, humans and animals, the natural and unnatural, the wild and domestic, male and female, and reason and emotion. “Monists,” on the other hand, deny that such distinctions are deep, instead seeing the items within these categories as continuous or entwined, or rejecting the categories altogether. Despite the attractions of monism, it is difficult to make sense of many environmentalist claims without invoking dualisms of one sort or another. The trick is to figure out when and to what extent such dualisms are useful.

Consider the idea that humans are part of nature. If humans and beavers are both part of nature, how can we say that deforestation by humans is wrong without similarly condemning beavers for cutting trees to make their dams? How can we say that the predator–prey relationships of the African Savanna are valuable wonders of nature while at the same time condemning humans who poach African elephants? More fundamentally, how can we distinguish the death of a person caused by an earthquake from the death of a person caused by another person?

Aesthetically appreciating nature also seems to require a deep distinction between humans and nature. Aesthetic appreciation, at least in the normal case, involves appreciating something that is distinct from one’s self. Perhaps it would be possible to appreciate some aspect of oneself aesthetically, but that would require a strange sort of objectification and appear to be a form of vanity.

Some might say that this is no great loss, since viewing nature aesthetically is a way of trivializing it. As we shall see in Section 8.4, this claim rests on a false view of the value of aesthetic experience. Moreover, it is a plain fact that environmentalists often give aesthetic arguments for protecting nature, and these arguments are extremely powerful in motivating people. For anyone who has spent time in such places as the Grand Canyon, it is easy to see why. The view from the south rim is an overwhelming aesthetic experience for almost anyone. Jettisoning aesthetic arguments for protecting the environment would greatly weaken the environmentalists’ case.

³ In different ways, the rejection of dualism is a theme of both “deep ecologists” (e.g., Næss 2009) and “ecofeminists” (e.g., Plumwood 1993). For overviews of these positions, see Jamieson 2001: chs. 15–16. For an overview of feminist environmental philosophy, see plato.stanford.edu/entries/feminism-environmental/.

This ambivalence between seeing humans as both part of but also separate from nature is part of a larger theme that runs through environmentalism. Under pressure, environmentalists will agree that Harlem is as much a part of the environment as Kakadu National Park in Australia, but it is a plain fact that protecting Harlem is not what people generally have in mind when they talk about protecting the environment. Moreover, much of the history of environmentalism has involved distinguishing special places that should be protected from mundane places that can be used for ordinary purposes.

Consider an example. The contemporary environmental movement is often dated from the early twentieth-century struggle of John Muir and the Sierra Club to protect the majestic Hetch Hetchy Valley, in the recently created Yosemite National Park, from a proposed dam intended to provide water and electricity to the growing city of San Francisco. Muir had no trouble suggesting alternative water supplies for the city, going so far as to say that “north and south of San Francisco . . . many streams waste their waters in the ocean.”⁴ Hetch Hetchy was special, according to Muir, and his arguments against the dam appealed, in quasi-religious terms, to its unique character and majesty. This idea that there are special places that deserve extraordinary protection is part of the historical legacy of environmentalism, and reflects an attitude going back at least to our Neolithic ancestors.

As these examples suggest, there are deep ambivalences in environmental thought and rhetoric. On the one hand, judging human action by a standard different from “natural” events requires distinguishing people from nature, but convincing people to live modestly may require convincing them to see themselves as part of nature. Aesthetically appreciating nature involves seeing ourselves apart from nature, but this is supposed to be the attitude that gives rise to environmental destruction in the first place. The environment is everything that surrounds us, but some places are special.

Someone who is unsympathetic to environmentalism might reject my polite but vague description of these cases as expressing “ambivalences.” Such a person might say instead that environmentalism is a view that is enmeshed in paradox and contradiction and, for these reasons, should simply be given up. This, however, would be the wrong conclusion to draw. I agree that we take different perspectives on nature and the environment on

⁴ From a 1909 pamphlet by John Muir, available on the web at www.sfmuseum.org/john/muir.html.

different occasions, and sometimes, perhaps, even simultaneously; and that it is a challenge to understand these phenomena and to bring them together. In my opinion, however, this is not peculiar to our thinking about the environment, but reflects deep tendencies in human thought. What for some purposes we see as the setting of the sun, for other purposes we see as a relation between astronomical bodies. What from one perspective we see as a man who is a predictable product of his environment, from another perspective we see as an evil person. We live with multiplicity; the trick is to understand it, and to deploy our concepts productively in the light of it.⁵

Consider, for example, the stances that we take towards our fellow humans. We are almost never single-minded about them, nor are our attitudes serial or linear. We live with multiple views and perspectives, often held simultaneously, sometimes with quite different valences. Imagine a colleague who is excellent at his work, narcissistic in his behavior, an emotional abuser of women, but a charming and intelligent social companion. I might happily work with him on a project, but I would not introduce him to a female friend. I might enjoy going to the movies with him, but I would not open my heart in a conversation over dinner. I would say that such complexity in human relationships, rather than plunging me into inconsistency is the stuff of everyday life.

Our relationships to nature are no less complex. Consider my relationship to the Needles District of Canyonlands, part of the American wilderness system. I have hiked and camped there, experiencing the sublimity of Druid Arch and the luminescence of the full moon over Elephant Canyon. In searching for water, I have felt myself to be part of the natural system that orders and supports life in this desert. I am irate about proposals to open this area to off-road vehicles. Such a policy would be unjust to backpackers and wilderness adventurers, who would lose the silence and solitude that make their wilderness experiences possible. I also mourn for the wildlife that would be destroyed or driven away by such a policy. I find the idea of people treating this place as if it were some desert speedway both vulgar and disrespectful. My attitudes towards this area embody multiple perspectives: a recognition that who I am is defined, at least in part, by my relationship to this place; a desire for the aesthetic experiences that it affords; and most of all, a passion that those who love and inhabit this place be treated justly. The moral psychology of my

⁵ For a celebration and defense of this attitude, see Goodman 1978.

attitudes is complex, but it should not be surprising that our attitudes towards nature can be as complex as our attitudes towards our conspecifics.

1.3 Environmental problems

Even if there were no environmental problems, there would still be a place for reflecting on ethics and the environment. However, what has given our subject its urgency and focus is the widespread belief that we are in an environmental crisis of our own making. Many biologists believe that the sixth major wave of extinction since life began is now occurring, and that this one, unlike the other five, is being caused by human action.⁶ Atmospheric scientists tell us that the anthropogenic (i.e., human-caused) global warming that is now under way may already have surpassed anything that humans have experienced. Many other examples could be given.

Some doubt the seriousness of this crisis because they are skeptical about the science. They think that scientists exaggerate their results in order to obtain more research funding. Or they are put off by the methodologies used in environmental science that often involve “coupling” highly complex computer models, and using them to produce forecasts or “scenarios” on the basis of data sets that are often seriously incomplete. Of course, the same concerns can be raised about other sciences, including those that inform the management of the economy. The defense in both cases is the same: there is no better alternative than to act on the basis of the best available science, recognizing that it is the nature of scientific claims to be probabilistic and revisable. Of course, it may turn out that the skeptics are right and that environmental science is mostly a bunch of hooey. But then, I may also win the lottery.

Every so often a book is published that largely accepts the findings of environmental science, but views the glass as half full rather than half empty. According to these critics, environmentalists focus only on the “doom and gloom” scenarios and ignore the good news. Life expectancy, literacy, and wealth are increasing all over the world.⁷

⁶ Kolbert 2014.

⁷ Bjørn Lomborg has made a career of this line of argument (e.g., in his 2020 book); for a trenchant review, visit www.nytimes.com/2020/07/16/books/review/bjorn-lomborg-false-alarm-joseph-stiglitz.html.

While there has been progress in addressing some environmental problems, it has been patchy and incomplete. Air quality in the United States, for example, steadily improved from the passage of the Clean Air Act in 1970 until 2016, but then progress reversed and air quality has since deteriorated.⁸ Even the four-decade-long improvement masks the fact that in some parts of the United States (especially those inhabited by poor people or people of color) there was little improvement and in some cases deterioration. In any case it is hard to claim success when air pollution kills between 100,000 and 200,000 people per year in the United States and perhaps as many as 800,000 people per year in Europe.⁹ The toll is much higher in the developing world with air pollution claiming as many as 7 million lives globally.¹⁰

Some people deny the seriousness of environmental problems, not because they believe that we are making great progress in addressing them, but because they believe that the changes that we have set in motion will have limited or even positive impacts. They have an image of nature that views it as resilient, almost impervious to human insults. Sometimes this vision is inspired by the “Gaia hypothesis,” put forward by the British scientist James Lovelock in the 1970s. According to Lovelock, Earth is a self-regulating, homeostatic system, with feedback loops that give it a strong bias in favor of stability. From this perspective, it would be surprising if the actions of a single species could threaten the basic functioning of the Earth system.¹¹

Others, especially many environmentalists, view nature as highly vulnerable and planetary systems as delicately balanced. In their view, people have the ability to disrupt the systems that make life on Earth possible. While once people needed to be protected from nature, today nature needs to be protected from people.

Both of these views have more the character of an ultimate attitude or even a religious commitment than of a sober scientific claim that can be shown to be true or false. However, even if those who are most skeptical

⁸ Clay, Muller, and Wang 2021.

⁹ Goodkind et al. 2019, Bowe et al. 2019, Lelieveld et al. 2019.

¹⁰ www.who.int/health-topics/air-pollution.

¹¹ Later, however, even Lovelock (2006) became pessimistic about the human impact. Generally on Gaia, see Volk 2003.

about the existence of an environmental crisis are correct, this would not obviate the need for reflecting on the ethical dimensions of environmental questions.

Suppose that it is true that environmentalists dwell on the dark side and that, however implausible this may seem, things are really getting better all the time. Even if this were true, an improving situation is, by definition, not the one that is best. So long as one innocent person dies unnecessarily because of environmental harms caused by others, there is a need for ethical reflection.

Suppose, as do those who are inspired by the Gaia hypothesis, that Earth's systems are resilient. It would not follow from this that environmental problems are not worth taking seriously. Even if Earth systems successfully respond to our environmental insults, there may still be a high price to pay in the loss of much that we value: species diversity, quality of life, water resources, agricultural output, and so on. Through centuries of warfare, European nations demonstrated their resilience, but millions of people lost their lives, and much that we value was destroyed. Moreover, even if it is highly unlikely that human action could lead to a collapse in fundamental Earth systems, the consequences of such a collapse would be so devastating that avoiding the risk altogether would be preferable. Just as it is best not to have to rely on the life-saving properties of the airbags in one's car, so it would be best not to have to rely on the resilience of Earth's basic systems.

Environmental problems are real and urgent. They are diverse in scale, impact, and the harms they threaten. They can be local, regional, or global. They can involve setbacks to human interests, or they can damage other creatures, species, or natural systems. These features of environmental problems will be discussed in Sections 1.4 and 1.5.

1.4 Questions of scale

Many environmental problems are local in scale, and people confronted them before the word 'environment' existed. For example, the common practice in medieval Europe of tossing sewage into the street caused an environmental problem that was largely local in scope. My neighbor who insists on playing heavy metal music at all hours also causes a local environmental problem. Noise is ubiquitous in modern life, and we do not often think of it in this way, but it has many of the hallmarks of a classic pollutant. It causes people to lose

sleep and to stay away from home, and it generally degrades their quality of life. There is evidence that persistent exposure to high levels of noise can even raise blood pressure and impair cognitive development. Noise pollution can spread out from being a matter of one household affecting another, to being a serious urban problem, as anyone who has ever lived in a large metropolitan area such as New York City can testify.

Another local environmental problem that is often not viewed in this way is the exposure to tobacco smoke. This is a much more serious problem than noise pollution, claiming thousands of lives each year. Local environmental problems can affect quality of life or seriously threaten life itself.

Some environmental problems are regional in scope. In these cases people act in such a way that they degrade the environment over a region, thus producing harms that may be remote from the spatiotemporal location of their actions. Rather than involving one event that simply produces another event in the same locale, they involve complex causes and effects spread over large areas. Air and water often provide good examples of regional environmental problems, since they follow their own imperatives rather than political boundaries. Floods and other water-management issues involve entire watersheds, and air quality involves the dynamics of the troposphere.

The catastrophic floods that occurred in China in 1998 provide another example of a regional environmental problem. For decades, deforestation has been occurring in the upper elevations of the Yangtze River Basin. When extremely heavy rains occurred in June and July of that year, runoff was much more intense and rapid as a result, leading to floods that affected more than 200 million people and killed more than 3,600.

Over the last several decades, global environmental problems, such as climate change and stratospheric ozone depletion, have captured a great deal of attention. These are problems that could not have existed without modern technologies.

Ozone depletion is caused by chlorofluorocarbons (CFCs) – a class of chemicals that was invented in 1928 for use as refrigerants, fire extinguishers, and propellants in aerosol cans. CFC emissions, through a complex chain of chemistry, lead to the erosion of stratospheric ozone, thus exposing living things on Earth to radically increased levels of life-threatening ultraviolet radiation.

The climate change that is now under way is caused by human action: land-use changes and the emissions of “greenhouse gases,” principally

carbon dioxide, a byproduct of the combustion of fossil fuels.¹² The massive consumption of fossil fuels that fed the Industrial Revolution and continues to support the way of life of industrial societies is causing the climate change that is now under way. Since the preindustrial era, the Earth has already warmed more than 1°C (1.8°F), and we may already be committed to another 0.5°C (0.9°F) warming over the course of the twenty-first century.¹³ If our present behavior continues, we may well bequeath to future generations the most extreme and rapid climate change since the age of the dinosaurs.

1.5 Types of harm

Environmental problems inflict many different types of harm. For example, some environmental problems primarily affect the quality of life for human beings. The harms caused by my heavy-metal-loving neighbor are an example of this sort. No one will die nor will a species be driven to extinction by his boorish behavior, but the quality of life of his neighbors will be compromised.

Other environmental problems threaten human health. Indeed, the protection of human health is the primary rationale for most of the regulations issued by the United States Environmental Protection Agency. Regulations controlling pollutants in air and water, and levels of pesticide residues, are examples. Some statutes do require that other values be taken into account, but it is not too much of an exaggeration to say that over the years the United States Environmental Protection Agency has increasingly evolved into a public health agency.

Some environmental problems affect mainly nonhuman nature. While arguments have been made for why there is a human interest in protecting species diversity, for example, it is difficult to deny that blanket prohibitions against driving species to extinction presuppose values that are deeper than considerations about human health or quality of life. The American Endangered Species Act, for example, first passed in 1973, evinces a concern for species themselves that goes beyond considerations of human health or quality of life.

¹² Greenhouse gases are the suite of gases that trap heat in the atmosphere. Visit www.epa.gov/ghgemissions/overview-greenhouse-gases for further discussion.

¹³ www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf.

Economists call such goods that make no essential reference to human interests “pure environmental goods.” They find a place for them in their calculations through such concepts as “existence value.” The idea is that driving the spotted owl to extinction (for example) harms me even though it is not a threat to my health, life, or quality of life. I am harmed because I value the very fact of the owl’s existence, even if I were never to experience the owl directly. It is this existence value that is lost when the owl becomes extinct.

There are reasons to be dubious about this way of accounting for the loss of value caused by species extinctions. Value does not easily translate into harms and benefits to the valuer. A rich person and a poor person may both value equality and work for an egalitarian society, but it is undeniable that the rich person would be made worse off if their struggle succeeds.¹⁴ There are further difficulties that will be discussed in Section 10.5 about how we are supposed to compute the value of rare species. The main point here, however, is that environmental problems cause a wide range of harms.

1.6 Causes of environmental problems

There are many reasons for wanting to know what causes environmental problems. Understanding history is interesting in itself and can provide general guidance for how to think about the future. It can also be important in determining how to distribute responsibility, blame, and even punishment.

Sometimes knowing the cause of a problem is a direct line to identifying its solution. If I know that my computer isn’t working because it is not plugged in, the solution to the problem immediately presents itself: Plug it in. When I plug in the computer, I fix the problem by removing its cause. However, in some cases there are more elegant solutions to problems than removing their causes. For example, if I am late for an appointment because I’m stuck in traffic, teleconferencing is a better solution than trying to remove the problem by fixing the traffic jam. Still, it is generally good advice that when facing a serious problem, one should try to understand its cause.

¹⁴ Karl Marx’s patron and coauthor, Friedrich Engels, was a wealthy industrialist who would have been economically ruined if the communism that he advocated would have prevailed.

Another reason why it is important to understand the causes of environmental problems is that people respond quite differently depending on how they are caused. A classic example concerns lung cancer deaths caused by inhaling cigarette smoke compared with those caused by radon exposure. Cigarette smoking is the leading cause of lung cancer in the United States, killing about 480,000 people per year with 41,000 of those deaths resulting from secondhand smoke, while inhaling naturally occurring radon gas is second, killing about 21,000 people per year.¹⁵ Yet despite the comparative risks, people are much more motivated to regulate secondhand smoke than radon exposure. Our moral psychologies and reactive attitudes are geared to what we do to each other, rather than to what nature does to us even when this is mediated by human agency.

In the debate over climate change, there have been several stages of denial: First, climate change isn't happening; then climate change is happening, but it is natural; next, climate change is happening and partly caused by people, but on the whole quite a good thing; now, it's happening but there's nothing much we can do about it. Implicit in the second stage of denial is the view that if climate change is a naturally occurring phenomenon, then no one can be held responsible for its toll. Tell this to the people of New Orleans who were victimized by human agency, whether or not Hurricane Katrina was a product of climate change or naturally occurring weather patterns.

1.7 The role of technology

There are many theories about the cause of environmental problems. Perhaps the most influential at present centers on technological failures and solutions. This view claims that we are victims of our success. We suffer from environmental problems because we have become rich and mobile so quickly that we have overwhelmed the technological systems that enabled these successes to occur. When few people had automobiles, it did not matter very much that they were highly polluting. When everyone has an automobile, they become an environmental problem. When few people

¹⁵ Smoking data from: www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/. Radon data from: www.epa.gov/radon/healthrisks.html. Generally on this issue see Edelstein and Makofske 1998.

can afford furniture made from tropical hardwoods, gathering the materials does not harm the environment. When many people buy furniture made from tropical hardwoods, the problem of deforestation occurs. This kind of story can be told for many environmental problems.

The solution, on this picture, is a new round of technological development. Previous generations of technologies were developed to solve problems and reduce labor in a world in which environmental costs were not significant. Now that we recognize the importance of environmental costs, a new generation of technology is needed that performs these labor-saving functions but is lighter on the planet. Thus, the enthusiasm for electric cars that allow us to zip down the highway to our local shopping mall, but with much less impact on the atmosphere than cars powered by internal combustion engines.¹⁶ Other leaders and opinion-makers are calling for new technologies for decarbonizing coal, or even technologies that would allow us to geoengineer climate. The examples can be multiplied.

Technological approaches are popular both with politicians and with the public because they promise solutions to environmental problems without forcing us to change our values, ways of life, or economic systems. Moreover, for many people who came of age in the post–World War II period, the image of the scientist as the “can-do” guy who can solve any problem remains quite potent. Thus it should not be too surprising that politicians of various stripes advocate buying our way out of environmental problems through scientific research and technological development, though there is often considerable vagueness about what these new technologies should be or what they might actually accomplish. Whatever potential such high-tech solutions may have for ameliorating the environmental problems most on the minds of the rich people of the world, they seem almost entirely irrelevant to the needs of the poorest of the poor, who often are locked in a day-to-day struggle with life-threatening air and water pollution.

1.8 The economic perspective

Economists tend to be skeptical of technology-driven approaches. Simply talking about the need for new technologies or subsidizing their

¹⁶ This of course assumes what cannot be assumed: that the electricity that powers the electric car is produced from non-fossil fuel sources.

development will not guarantee that they will actually come into existence, much less that they will be widely adopted. In many cases, alternatives to environmentally destructive technologies already exist but are not widely used.¹⁷ The real solution to environmental problems lies in restructuring the system of economic incentives that has led to environmental destruction, and replacing it with a system that creates incentives for environmentally friendly behavior, including the development and use of “green” technologies.

Economics begins with the recognition of scarcity. A world in which everyone could have everything they wanted all of the time would be a world without economics. But our world is one in which scarcity occurs on all of these dimensions: Not everyone can have everything, and even those things that everyone can have, they may not be able to have them all of the time. Consider the example of a park near where I live: Washington Square Park in Greenwich Village in Manhattan. Even those who have access to the park cannot use it as they wish at all times. Parents with strollers use the park at some times of the day, skateboarders at other times. Sections of the park are allocated to drug dealers, others to tourists. We live in a world in which the vastness of our desires is greater than the resources for satisfying them.

From the perspective of economics, environmental problems concern the allocation of two types of scarce resources: sources and sinks. Things as different from one another as oil, elephants, and the Grand Canyon can be seen as sources that provide opportunities for consumption. Oil is consumed, in refined form, by burning it in our automobiles. Elephants are consumed by killing them and using their ivory, or even by photographing them. We consume the Grand Canyon by using it for backpacking or hiking, or by viewing it from airplanes and helicopters. Sinks provide opportunities for disposing of the unwanted consequences of production and consumption. A river is used as a sink when a factory dumps wastes into it. The atmosphere is used as a sink when I drive my car to the supermarket, emitting nitrogen oxides, carbon monoxide, carbon dioxide, and other chemicals from the

¹⁷ For example, Pacala and Socolow (2004) showed that we could satisfy a large fraction of global energy demand over the next fifty years while limiting atmospheric concentrations of CO₂, using only existing technologies. Unfortunately their recommendations were not followed and the challenges have become much more difficult (Davis et al. 2013).

tailpipe. Some of the most serious environmental problems occur when the same resource is used both as a source and as a sink: for example, when the same stretch of river is used both as a water supply and as a sewer; or when the same region of the atmosphere is used as a source of oxygen to breathe and as a sink for disposing of various pollutants. Using the environment as a source or a sink typically degrades its ability to function. Thus, opportunities to use the environment in these ways can be viewed as scarce resources.

The fundamental economic question regarding the environment involves determining the most efficient allocation of these scarce resources. 'Efficiency' (like 'consumption') is used as a technical term by economists: An efficient state of affairs in this vocabulary is one in which no one can be made better off without making at least one person worse off. The allocation of environmental goods is typically inefficient for a number of reasons, the most important of which is that environmental goods have many of the characteristics of public goods.

Pure public goods are typically defined as goods which are "non-rival" and "non-excludable." They are non-rival in that one person's consuming the good does not diminish another person's consumption. They are non-excludable in that they are available to everyone. The paradigm of a pure public good is national defense: It is available to everyone and its value to each person is not diminished by its availability to others.

Environmental goods such as sources and sinks have some but not all of the properties of public goods: In many cases they are relatively non-excludable, but significantly rivalrous. Everyone can use them but each use slightly degrades them.¹⁸ It is difficult to allocate such goods efficiently because people use them, diminishing their value to others, without paying the full costs of their use.

Consider the following example. Suppose that I want to buy your car. You have a right over the use of the car, and you won't transfer it to me unless I give you something in return that you value more, typically a particular sum of money. If we can agree on a price for the car, then at least by our own lights the transaction makes us both better off. You would rather have the money than the car, and I would rather have the car than the money. We have

¹⁸ Such goods are sometimes called "common pool resources," but there is no harm for our purposes in calling them public goods, so long as we recognize that they typically do not have all the properties of pure public goods to the fullest extent.

reached, in the economist's sense, an efficient outcome. So, cheerfully, I drive away in my new car, spewing out of the tailpipe a noxious brew of chemicals that contributes to climate change and also to various forms of air pollution that kills many innocent people, including senior citizens, asthma patients, and people with heart disease. While I had to pay your price in order to obtain the right to drive the car, there is no one I have to pay in order to obtain the right to dump these pollutants into the atmosphere. The consequence is obvious. Markets may allocate private goods to their highest valued uses, but public goods such as the atmosphere will be overexploited because they are free to those who use them. The result will be diminishing resources and increasing pollution. Welcome to the environmental crisis.

To put the point a little more formally, the costs of consuming private goods are "internal" to the good: They are borne by the owner and reflected in the price. The costs of consuming a public good, on the other hand, instead of being internal to the good, are "externalized" over the entire community. Thus, the full cost of using a public good is not reflected in its price. The solution, from this perspective, is to privatize public goods, or create policies that mimic the outcomes that a properly functioning market would deliver.

The obvious objection to the first approach is that there is a reason why markets have not developed for many environmental goods: They simply do not have the characteristics of private goods. Consider again the example of my newly purchased automobile. When it comes to cars, it is not difficult to distribute enforceable property rights, but what would it mean to create such rights to the atmosphere? Similar problems occur with other environmental goods such as the biological resources that constitute biodiversity. Of course we can imagine various ways of trying to implement such a privatizing program, but they often seem like a joke. However, the fact that privatizing environmental goods is somewhere between improbable and impossible has not prevented powerful figures from advocating this policy. It has even been suggested that the way to save endangered species is to auction them off to the highest bidder. If they are really worth saving, the story goes, then they will be purchased by environmental groups who will protect them. Anyone who harms these animals would then be violating a private property right and could be prosecuted or sued.

The mainstream in environmental economics has advocated a more sensitive mix of policies involving taxes, subsidies, and regulations that would

mimic the results that would be produced by a well-functioning market in environmental goods. The problem with this “kinder, gentler” approach is that it does not respond to the most fundamental objections to the economic perspective. How can we protect the interests of entities that do not themselves participate in markets? What happens if the optimal economic approach is not to save the whales, but rather to harvest them as quickly as possible and invest the returns in high-yielding junk bonds? How can future generations be represented in present transactions that will affect them when they do not yet exist?

Ultimately, on this approach, entities that do not participate in markets have no recognized welfare that the economic system is in a position to promote. Whatever value attaches to the Grand Canyon, polar bears, and clean air is solely in virtue of the preferences of people who do participate in markets. If people value these things highly, then they are highly valuable; if they do not, then they are not. But people’s preferences for environmental goods are highly contingent and historically variable, and there is little reason to believe that a purely economic approach, even one that reached efficiency, would produce any long-standing policy of environmental preservation. Consider, for example, how preferences regarding the environment of North America have changed since white settlement began. When the Puritans wrote their relatives in England and told them that they were living in a “wilderness,” they meant this as a term of abuse. What today we designate by the neutral term ‘wetlands’ were ‘swamps’ only a generation ago.¹⁹ The great seventeenth-century philosopher, John Locke, whom many credit as the foremost influence on the American constitution, saw uncultivated land as a “waste,” utterly without value.

For many preferences it matters little that they are skittish and volatile. One generation values baggy pants, while the next goes for skinny jeans. From a global point of view, it matters little which we prefer, and anyway we can be sure that in due course the preferences will be reversed. But as we shall see in Chapters 7 and 8, there are important noneconomic reasons for supposing that some environmental goods have importance in their own right. Moreover, some preferences are such that they are not reversible.

¹⁹ Ecologists have recently tried to rebrand ‘swamp’ as a term referring to a particular kind of wetland. I am tempted to say that these efforts have been “swamped” by the older connotation.

If the goods in question fall out of favor and are eliminated, then unlike baggy pants and skinny jeans, they can never be recovered. All it takes is one generation that values the return from junk bonds or a world without predators more than marine mammals or wolves, and we can be sure that whales and wolves will never again inhabit the earth, regardless of what preferences future generations might have in this regard.

This leads to the next problem: how to value the preferences of future generations adequately. The standard practice in economics is to “discount” the value of the future impacts of any policy that is adopted in the present. This practice can be rationalized on a number of grounds. First, there are probabilistic reasons: The present is certain and the future is not, however likely it may be; and even if the future does come to pass, the predicted consequences may not. The second reason for discounting is that people and economies are dynamic and productive. It makes sense for me to borrow money at an agreed rate of interest because, if I use this money wisely, when the loan comes due, I can pay the principal and the interest and still make a profit.

However, it is quite common in public decision-making to apply a discount rate to extremely long-term benefits and costs on the basis of rather vague considerations such as the belief that future people will be better off than present people because of capital investment, technological innovation, and continued economic growth. While there may be some empirical basis for such beliefs, they are largely expressions of faith. Even if one is sympathetic to this faith, it is still not easy to see how these beliefs translate into some specific rate for discounting the future. For this reason it is easy to see how this attitude can slip into “pure time preference”: preferring present benefits to future benefits simply because of their location in time. Even without pure time preference, the power of compound interest has the unwelcome consequence that costs deferred to the further future are worth almost nothing at present. Worse still, the future damages entailed by some present policies may not be compensable at all.

Table 1.1 brings out the power of compound interest, and its interactions with the choice of particular discount rates. Once one understands the consequences for the further future of even modest discount rates, it is easy to see why some economists have thought that preventing the worst impacts of a global warming that will be felt over centuries was not worth sustaining even a small loss to the economy today, and this is part of why we face our present climate catastrophe.

Table 1.1 *Estimated number of future benefits equal to one present benefit based on different discount rates*

Years in the future	1%	3%	5%	10%
30	1.3	2.4	4.3	17.4
50	1.6	4.3	11.4	117.3
100	2.7	19.2	131.5	13,780.6
500	144.7	2,621,877.2	39,323,261,827	4.96 × 1,020

Source: Adapted from Cowen and Parfit (1992).

Even more importantly, the negative effects of environmental destruction are often not costs that can be compensated for at all. If someone takes my bank account or even my house, there is a sum of money that would allow me to replace them. If someone takes my best friend or my companion, there is nothing that can replace them. What are we to say of actions that completely eliminate mountain gorillas, wild nature, a stable climate, or clear skies?

Some people find the economic perspective on the environment inherently distasteful. They reject the idea that pollution is inevitable and that the goal of public policy should be to ensure that it occurs at the “optimal level.” They point out that such a policy implies that pollution will be allocated to regions and populations where the costs are lowest; in other words, that poor people will suffer most from pollution. Some years ago a memo attributed to Lawrence Summers, then an economist at the International Monetary Fund, was published in the British magazine, *The Economist*. The memo stated that the problem with pollution in the developing world is that there is not enough of it, and that an optimal allocation of pollution would bring more of it there where costs are low, and less of it to the tonier parts of the developed world. At various times Summers has denied that he was the author of the memo or claimed that it was a joke.²⁰ Despite the outrage that many people felt, it certainly did not hurt his career. He subsequently served as the United States Secretary of the Treasury and as president of Harvard University. For our purposes, what is important is that the memo clearly

²⁰ Versions of the memo are widely available on the web. See, for example, http://en.wikipedia.org/wiki/Summers_memo.

states a plausible implication of the economic view of the environment, and it is precisely this implication that many people find repugnant.

Other critics of the economic perspective grant that it brings into focus a very powerful and important set of instruments that can be used to protect the environment, but object that it does not go far enough in analyzing the causes of our problems. If it is true, as most economists would agree, that we have created an economic system that provides incentives for environmental destruction, this fact too stands in need of explanation. Why have we created such a system? Why is it so difficult to reform? Almost every attempt to create a more rational system of incentives, by imposing carbon taxes, for example, or even raising the mileage standards for automobiles, meets ferocious resistance from a population that overwhelmingly considers itself “green.” What does this tell us about ourselves, and the political systems that we have created? These important questions about behavior are not easy to answer from within the economic perspective itself.

1.9 Religion and worldviews

In 1967, Lynn White Jr., a historian from the University of California at Los Angeles, gave a lecture to the American Association for the Advancement of Science that had an enormous impact on the subsequent discussion of the causes of environmental destruction. The article, originally published in *Science*, has been reprinted dozens of times. In the hundreds of books and articles in which it has been discussed, it has been vilified as much as praised. Essentially what White claimed was that the environmental crisis is fundamentally a spiritual and religious crisis, and that its ultimate solution would itself have to be spiritual and religious.

White located the source of the environmental crisis in the exploitative attitude towards nature that is at the heart of the dominant strand of the Christian tradition. As a historian of science and technology, White did not underestimate their importance to the environmental crisis. However, he saw them as proximate rather than ultimate causes. On his view, science and technology themselves are expressions of the dominant tendencies within Christianity.

White granted that environmental problems occur all over the world, even in those regions that we do not think of as part of the Christian world. Yet even there Christianity is ultimately responsible for the environmental

crisis through her progeny, science and technology, and her heresies, such as Marxism.

What is special about Christianity, according to White, is that it is the most “anthropocentric” of world religions. At the center of the traditional Christian story is God becoming man in the figure of Jesus. This idea is blasphemous from the perspective of other Abrahamic traditions such as Judaism and Islam. Rather than “anthropocentric,” these traditions are fundamentally “theocentric.” In both Judaism and Islam, God is utterly transcendent. He is as radically distinct from humans as he is from nature. Both humans and nature are his handiwork, but they are not in any way divine. In Asian traditions such as Buddhism, Hinduism, and Jainism, for example, the idea of the divinity of Jesus would not come as big news. For in these traditions, divinity is seen as manifest among all living things. Indeed, within these traditions the goal of spiritual practice is often seen as the realization of the divinity within oneself. In contrast to Christianity, what all of these traditions share is the rejection of anthropocentrism. It is this anthropocentrism, which White believes is unique to the dominant form of Christianity, that gave rise to the development of modern science and technology, which in turn has led to the environmental crisis.

White tells his story in some detail. For him, the development of new forms of plowing, irrigation, and logging in the late medieval period marks the beginning of the rise of modern science and technology. The introduction and widespread adoption of these technologies also mark the beginning of the modern view of the world. On this view, nature is there to be managed by humans for their benefit. White points out that the use of these technologies was often opposed by those who clung to a minority tradition within Christianity, one that sees the human transformation of the earth as an expression of the sin of pride. This minority tradition emphasized that the role of humans is to live in partnership with nature, rather than to dominate it. The twelfth-century saint, Francis of Assisi, is emblematic of this tradition. White believes that any real solution to our environmental crisis will have to draw on such minority Christian traditions, as well as on traditions from Asia and those found in indigenous cultures.

Whether or not White is correct in the details of these claims, what is most important in his account is that, for him, religions and worldviews can have profound consequences for human behavior, society, and ways of life. It is no exaggeration to say that he sees the environmental crisis as the

ultimate product of how we view the world. This is in stark contrast to those who view the environmental crisis as the product of material forces or relations.

Because Marxism these days is widely seen as a discredited theory, it is worth noting how complete its victory has been in some areas of thought. Many of those who reject Marxism's particular economic theories still accept its economic determinism. On this view, social change is fundamentally driven by economic facts. Marxist economists used to say that environmental problems were caused by privatizing environmental goods and the solution is to socialize them. Today economists say the reverse: Environmental problems are caused by "socializing" environmental goods and the solution is to privatize them. Both agree that environmental problems are caused by the distribution of property rights and incentives. They disagree about exactly what is the correct explanation, but they agree about the terms. For both of them, the correct explanation of environmental degradation is one that is fundamentally economic in character. This view is as congenial to Nobel Prize-winning economists and distinguished legal theorists as it was to those who held professorships of "dialectics" in the old Soviet Union.

1.10 Ethics, aesthetics, and values

In Sections 1.1–1.9, we examined several different accounts of the causes of environmental problems. We interpreted them in their extreme forms as providing single-factor, ultimate explanations. Each of these accounts is insightful, but none is very convincing as the whole story – the one that we should accept to the exclusion of all others. For our purposes, it is sufficient to view these different accounts as providing resources that can be used for understanding aspects of particular problems and the range of possible solutions. There is no need for us to struggle for a single, unified theory of environmental problems. Indeed, no such account might be forthcoming.

Normally, we think of environmental problems and their possible solutions as multidimensional. If we are concerned with air pollution, for example, we may adduce a host of considerations in discussing why it is bad, what its causes are, and what may be the solutions. We may talk about the health and economic effects of air pollution, the loss of aesthetic values it entails (such as the erosion of clear skies and big views), its impacts on

natural systems, and a wide range of other consequences. In explaining its causes, we may mention the perverse incentives that encourage the use of private automobiles rather than public transportation, the inappropriate technologies involved in heating and cooling, and the attitudes of people who put their own shortsighted interests above everything else. We may consider possible solutions ranging from public campaigns to change attitudes, to carbon taxes, congestion pricing, and the development of alternative technologies. We may disagree about the comparative importance of various factors, but it would be strange to think that any one of them is beside the point, irrelevant, or completely out of bounds.

In short, we are pluralists about the nature of environmental problems, their causes, and solutions. In both public and private decision-making, we are not primarily motivated by a concern for theoretical rigor or ultimate explanation, but by what will contribute to solving our problems. We adopt the vocabularies that are useful, that connect with how we and others think about these problems, and the kinds of considerations that move us and others to action. When it comes to environmental problems, it is clear that these include scientific, technological, and economic considerations, but they also include considerations about ethics, values, and the aesthetic dimensions of the environment. Perhaps one day we will discover that this vast array of concerns can be reduced to a single concept, but whether or not this is the case is of little relevance to addressing our current problems.

Consider an example. Suppose that I have a friend who has difficulty completing projects, and this leads to all sorts of problems in both his professional and his personal life. Indeed, these are interconnected: His difficulty in completing projects inhibits his professional advancement, which puts serious pressure on his marriage, and makes it difficult for him to care properly for his children. As his friend, how should I think about his problems? What I should not do is to spend very much time wondering whether there is a single explanation for everything that is wrong with his life. Consider the vast array of candidates. Perhaps birth order is the answer, his having been weaned too soon, the negative reinforcement he got at school, his tendency to day-dream, or his feelings of worthlessness. Perhaps the problem is in his genes, his brain chemistry, or his failure to make authentic, autonomous decisions or to act on the basis of the moral law. As his friend, I should worry about causes in order to help think about interventions, not because I am interested in providing an elegant explanation of his problems. The interventions that

might help are quite diverse, ranging from quietly encouraging him to complete his projects to assisting him in seeking medical attention. They may involve taking his side in disputes in the workplace, giving him tips on how to do his job more effectively, or even encouraging him to change jobs. Sympathetically interpreting his behavior to his colleagues and even to his wife may help. So may encouraging both him and his wife to undertake marriage counseling. Even taking his kids to the ballgame might help to alleviate some of the pressure. This is not elegant, but it is the stuff of real-life problem-solving. Even if there is one unifying explanation for my friend's behavior, I am not likely to know what it is, nor do I need to know in order to try to help him with his problems. The fact that I take one particular approach to trying to help him does not require me to reject all the others. We do what we can, when we can. As his friend, I will try different approaches at different times, trying to find something that works in understanding his behavior and helping him with his problems.

My claim is that much the same is true of environmental problems. On their face, they are complex and multidimensional. They can be described in different vocabularies and can be explained in various ways. Perhaps someday we will have an explanation of them that will show that they are really "such and such" and can best be solved by doing "so and so." However, it is far from certain that such explanations exist and, if they do, we are very far from having them at our disposal. At any rate, the entire question is of little importance to us now. My purpose is not to insist that environmental problems are really ethical, rather than economic, technological, or whatever, but rather to suggest that these problems present themselves to us as having important ethical dimensions. They can be thought about and discussed in these terms, and rather than trying to explain this away, we should follow the thread and see where it leads.

In the remainder of this book, that is exactly what I shall do. I will assume that among their many dimensions, environmental goods involve morally relevant values, and that environmental problems involve moral failings of some sort. To state my purpose more grandiosely: I will explore the idea that environmental problems challenge our ethical and value systems. If I am right about this, our thinking about the environment will improve by thinking about it in this way, and our moral and political conceptions will themselves become more sophisticated as a result of their confrontations with real environmental problems. Now, on with the show.