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CHAPTER

1

Ethics, Science, and the Environment

CASE ONE

Technological Solutions

Just after midnight on March 24, 1989, the oil tanker *Exxon Valdez* ran aground in Prince William Sound near Valdez, Alaska. Over the next few days, about 11 million gallons of oil poured out of its tanks, creating the worst oil spill ever in U.S. coastal waters. The oil killed tens of thousands of birds, hundreds of sea otters, and uncountable fish and other sea life. Hundreds of miles of shoreline were covered with oil, threatening the health and livelihood of local residents.

As part of the attempt to clean up this spill, workers used pressurized hot water to remove some of the tarlike oil covering the shoreline. The hot water softened oil that had been thickened by the cold Alaskan temperatures, making its removal from the rocks and sand easier. Pressurized hot water cleaners appeared to be a helpful solution to one small aspect of the cleanup. Unfortunately, few people considered the effects that hot water might have on microscopic and other life-forms that live among the rocks and sand of the shoreline. Few recognized at first that these life-forms, which contribute both to the biological decomposition of the oil and to the re-emergence of plant and animal life, would be killed when sprayed by hot water.[1]

On the opposite side of the earth, the agricultural lands bordering Egypt's Nile River had been subjected to annual flooding for as long as humans have lived in this area. Although these floods brought needed water for the crops, the extent, timing, and length of the flood could neither be predicted nor controlled. Erratic and unpredictable flooding was something that farmers had lived with for millennia. All this ended in the 1960s with the construction of the Aswan Dam.

The dam was built to supply hydroelectric power, and to provide irrigation and flood control. In many ways, these goals have been met. For example, many crops survived severe droughts in the early 1970s because of the water available from the dam. However, the dam has also created a multitude of environmental problems never envisioned by its original designers.

Although flooding was a major problem, it also fertilized these lands by depositing a layer of silt, washed away salts that built up in the soil, and helped remove snails that spread the parasitic disease schistosomiasis. As a result of the dam, this agricultural land now must be treated with costly chemical fertilizers. Salinization is slowly destroying the productivity of much of the land, and the incidence of schistosomiasis infections has risen steadily. Furthermore, the silt that was once spread across the land by floods now is building up in the waters of Lake Nasser behind the dam. The lake is slowly filling up with mud rather than water. Downriver, the Nile has so eroded its riverbed that smaller dams, bridges, and shorelines are being undermined. The increased erosion is due to the lack of sediment now in the Nile's waters. The lack of sediment also means that the Nile delta is eroding as well, allowing sea water to advance inland and destroy the productivity of other agricultural land. Since the river no longer deposits this nutrient-rich silt into the Mediterranean Sea, marine life around the Nile delta has been so depleted that Egypt's sardine, mackerel, shrimp, and lobster industries have been devastated. Finally, when a rare earthquake struck the Aswan area in 1981, some geologists suggested that the very weight of Lake Nasser itself was responsible.

1.1 INTRODUCTION

As we approach the twenty-first century, it is fair to say that human beings face environmental challenges unprecedented in the history of this planet. Largely through human activity, life on earth faces the greatest mass extinctions since the end of the dinosaur age 65 million

years ago. Some estimates suggest over a hundred species each day are becoming extinct and that this rate could double or triple within the next few decades.[2] The natural resources that sustain life on this planet—air, water, and soil—are being polluted or depleted at alarming rates. Human population growth is increasing exponentially. The 1990 world population of 5.5 billion people will increase by a billion people (nearly a 20 percent increase) within ten years. The prospects for continued degradation and depletion of natural resources multiply with this population growth. Toxic wastes that will plague future generations continue to accumulate around the world. The world's wilderness areas, its forests, wetlands, mountains, and grasslands are being developed, paved, drained, burned, and overgrazed out of existence. With the destruction of the ozone layer and the potential for a "greenhouse" effect, human activity threatens the very atmosphere and climate of the planet itself.

Although the pessimists among us might despair at this reality, many others look to science and technology for solutions. If only we could engineer more efficient solar panels, or harness the energy potential of geothermal, wind, or tidal power. If only we could develop alternatives to the internal combustion engine. If only we could master cold fusion. If only we could develop more productive and sustainable agricultural technologies. If only we could arrange economic incentives to discourage pollution.

For many people in our culture, and especially for many in policy-making positions, science and technology offer the only hope for solving environmental problems. Because environmental problems often involve highly technical matters, it is only reasonable to turn to experts in these technical areas for answers. Furthermore, since science offers objective and factual answers in an area where emotions run high and controversies abound, science seems an obvious candidate from which to seek help with environmental concerns.

Unfortunately, turning to science with the optimistic hope for a quick fix is not very different from the pessimistic attitude. Each involves individual citizens relinquishing the authority to make decisions about their world. Although it is tempting to turn to science and technology in the hope for a quick fix, environmental challenges are neither exclusively nor even primarily problems of science and technology. Environmental issues raise fundamental questions about what we as human beings value, about the kind of beings we are, about the kinds of lives we should live, about our place in nature, and about the kind of world in which we might flourish. In short, environmental problems raise fundamental questions of ethics and philosophy. Reliance on science or technology (or

even economics or the law) without also considering the ethical and philosophical issues can raise as many problems as it solves. Leaving environmental decisions to the "experts" in science and technology does not mean that these decisions will be objective and value-neutral; it only means that the values that do decide the issue will be the values these experts themselves hold.

This text provides an introduction to the many ways in which philosophical ethics can contribute to the creation of a sane and judicious environmental policy. Environmental issues raise fundamental questions about how we should live. Such questions are philosophical and ethical questions, and need to be addressed in a philosophically sophisticated way. Another assumption is that environmental policy ought to be decided in the political arena and not in scientific laboratories, corporate boardrooms, or government bureaucracies. A further goal of this text is to empower citizens to become full participants in these crucial public policy debates. Familiarity with the philosophical issues involved in these debates is a necessary first step in this direction.

1.2 SCIENCE WITHOUT ETHICS

As the cases that begin this chapter suggest, people take risks when they treat environmental problems merely as technical problems awaiting solution from some specialized discipline. In part this is because the dimensions of environmental issues are seldom limited to the specific boundaries of any one particular discipline. It is impossible to find an important environmental issue that does not cross boundaries between the sciences, economics, public policy, law, medicine, engineering, and so forth. Building the Aswan Dam and confronting the resulting problems, for example, has involved engineering, geology, agriculture, marine biology, medicine, chemistry, economics, politics, anthropology, and law. But it is equally impossible to find an environmental issue that does not raise basic questions of value. Approaching any serious environmental issue with the hope of discovering a technical "quick fix" guarantees only a narrow and parochial understanding of what is at stake. History testifies to the dangers inherent in this approach. Too often past technological or scientific "solutions" have resulted in as many new problems as they have solved.

But the danger in overreliance on science and technology extends beyond this simple point of technological complexity. Science is not as value-neutral as many assume. A very deep belief in our culture, so deep and unexamined that it takes on the dimensions of a cultural myth, views science as the ultimate authority on questions of

knowledge and truth. This "myth of scientific objectivity" says that unless our beliefs are validated by science, they remain in the realm of mere opinion: personal, subjective, arbitrary, biased. Although it is important not to overstate this point—science does have tremendous potential for helping us to understand and solve environmental problems—science is not the purely objective and value-neutral resource that so many people assume it to be.

This is not the place for a full discussion of the issue of scientific objectivity. However, I can mention several points that should give us pause when we are tempted to turn solely to science and technology for solutions to environmental problems. To help sort through these issues, it may be helpful to distinguish several common understandings of science. In common understanding, science is understood to be a *method for attaining knowledge, a body of information or "facts"* gained through that method, and a tool for controlling and changing the world.

In some ways the scientific method is nothing other than a careful, detailed, precise, and documented approach to knowledge. The practice of science demands that its practitioners minimize assumptions, seek to eliminate bias, verify results, and limit conclusions to what can be supported by the evidence. In this sense there is a very real "ethic" of the scientific method, which aims to ensure impartial, accurate, and rational results. To the degree that scientific practice measures up to this ethic, we can have confidence in the rationality of its result.

Nevertheless, hidden assumptions in this method may influence scientific practice. For example, in later chapters I discuss some observers who claim that modern science is dominated by models imported from physics. In that view, we best understand something (such as a physical object) when we reduce that object to its most simple elements (such as atoms or electrons) and investigate the forces that work on those elements (such as gravity and electromagnetism). But according to these critics, that approach is inappropriate when exported to other fields. Social sciences such as economics, sociology, and political science, for example, may well distort reality when "society" is reduced to a mere collection of individuals mechanically driven by the forces of self-interest.[3] More relevant to this book, some biologists believe that the physics model is particularly misleading in the study of ecosystems. The reductionist tendency can ignore or distort the complex relations that exist within an ecosystem. Reductionism literally fails to see the forests for the trees.

Likewise, a commitment to mechanistic explanations can also distort our understanding of ecological relationships. For example,

debates concerning our understanding of animal behavior are sometimes framed in mechanistic terms: *either* animals' behavior is caused by environmental conditioning, *or* it is controlled by genetic programing. Either way, the explanation can be stated in invariable, deterministic, mechanistic "laws of nature." Again, for many biologists this represents a distorted and oversimplified account of animal behavior. Even the simplest organism is capable of changing its environment as much as it (and its progeny) is changed by the environment. Biological and environmental changes seem to occur as much through random chance as according to deterministic laws.[4] Accordingly, a policy of wildlife management, for example, that was based on a mechanistic model of animal behavior would have very different consequences and recommendations from a policy assuming that change rather than constancy is the norm.

Thus despite the fact that the practice of science is committed to the values of impartiality and objectivity, the scientific method is not always the unbiased procedure it is taken to be.

Science is also sometimes understood not as a method or procedure but as a body of information or facts. Surely facts are objective, and if science discovers the facts, scientific knowledge must be objective; or so the myth of scientific objectivity would have us believe.

How comfortable should we be when we rely solely on scientific information to resolve environmental challenges? Even assuming that the facts are established through a careful, methodical, and verified procedure, we need to recognize that the "facts" seldom tell the whole story. Reliance on even well-established scientific information can be risky if that information fails to give us a complete explanation. Perhaps the biggest obstacle to getting the whole story is not science's inability to get answers, but science's limits in asking questions. Before relying on scientific answers to resolve environmental problems, we need to know what questions the scientists were asking.

Amory Lovins, an internationally recognized energy scientist, makes a similar point by reminding us that "the answers you get depend on the questions you ask."[5] Lovins uses an example from energy policy to make this point. If we define the energy problem as a supply problem, it is easy to conclude that people are running out of energy and are in need of new energy sources. Science and technology can help supply many answers to these problems. Science can document the facts of resource depletion; calculate the known reserves of coal, oil, and uranium; compare the technological advantages of various energy sources; predict the costs and efficiencies of generating plants powered by coal, oil, and nuclear energy; and

so on. We might thus imagine collecting a significant amount of relevant scientific data on the various alternatives of energy production. We may also imagine, given these facts, that one alternative (for example, nuclear fission breeder reactors) emerges as the most reasonable option. This decision, we may well imagine, is based on the objective, neutral "facts" of science.

But if we define our energy problem as a question of demand, we will come up with very different answers. Defined this way, we begin to ask questions about energy use, about matching energy source with energy use, about energy efficiencies, about appropriate technologies, and so on. A scientist who asks these questions is more likely to focus on such issues as home heating, insulation, efficiency of electric motors, lighting, appliances, fuel-efficient cars, or, better yet, mass transportation, solar power, and so forth. We can understand that the information emerging from these questions, as factual and as objective as the information coming from supply questions, will suggest very different energy policies. These "facts" might well prove that heating homes with electricity is quite unreasonable, even if the source of that electricity is safe and efficient when compared to alternative sources.

We have thus imagined a situation in which we have two sets of facts, each equally valid and objective from a scientific point of view, but each leading to quite different policy recommendations. One set of facts supports building new power plants, the other set supports a greater emphasis on appropriate technologies. In such a scenario, the scientific facts alone tell us nothing about which alternative we ought to choose. In later chapters, I examine the more general difficulties involved with reasoning from "facts" to "values." Philosophers have long recognized that descriptions of how the world is do not, in themselves, commit us to any particular value conclusions about how the world should be. Simply acknowledging the gap between statements of fact and statements of value is enough, at this point, to caution us against overreliance on science and technology.

But more to the point, we need to be especially careful in determining which questions are being asked by environmental scientists. If the questions are limited, so too will the answers be, and so too will be the policy recommendations that society adopts based on those answers.

So where do scientists get their questions? The answer—not as cynical as it might sound—is that scientific questions are formed to a large degree by the people who pay for scientific research. Contemporary, state-of-the-art scientific research is very expensive. Typically it is funded by government and private industry. The projects that get funded are the projects that answer questions being asked by government and industry. Science conducted under these conditions certainly does not always supply the answers that government and industry wants, but the likelihood of such science supplying radically different answers is seriously restricted.

For example, most of what is known about nuclear energy is the result of research supported by the U.S. government. Specifically, the Department of Defense has spent billions of dollars developing nuclear weapons. In fact, the standard design for a nuclear power plant is a modified version of the nuclear reactor that powers submarines. Thus, our knowledge about nuclear energy is directly traceable to political decisions made in a very different context.

This is not to suggest that such knowledge is somehow less reasonable or valid than it might be. However, we need to acknowledge that the environmental decisions we make depend on the available information and technology and that these depend on the types of questions being asked by scientists. You need only imagine the knowledge and technology that we would have about solar power, for example, if the money spent on nuclear weapons and nuclear research over the past fifty years had been spent instead on solar energy research.

Finally, another common understanding of science views it not only as a method for knowing or a body of information, but as a powerful tool for shaping the world. Here science is identified with technology and engineering and is seen as a major factor in humankind's progress and development. Science is seen as a major tool for controlling disease and early death, for conquering hunger and for helping humans to better survive in the world.

Science—understood generally to include engineering, technology, and the social sciences—does of course have much to contribute in resolving environmental problems. Its track record for explaining and controlling both human behavior and the natural environment is impressive. We should turn to science for help with environmental problems because it is a powerful tool for understanding and controlling the world. But like all tools, its use depends on the user's values and purposes. The time to examine these values and purposes is *before* we begin to use the tools.

If nothing else, intellectual honesty demands that we not overgeneralize the expertise of scientists. We should not deceive ourselves into thinking that because science demands objectivity and neutrality in its practice, all its uses are objective and value-neutral. Even if the scientific enterprise is committed to impartial and objective

methods and even if its findings are reasonable and true, the practical *uses* we make of scientific information may not be. We should also not deceive ourselves into thinking that simply because many environmental problems involve technical issues they do not raise ethical questions as well. The myth of objectivity that sometimes surrounds science can obscure these points. As we'll see, one role of environmental philosophy is to make explicit the hidden value assumptions of alternative environmental policies. And sometimes this requires us to examine the value assumptions implicit in science and technology.

1.3 ETHICS WITHOUT SCIENCE

Nevertheless, it would be a mistake to think that some abstract ethical theory can resolve environmental controversies. Ethical and philosophical analysis done in the abstract, ignorant of science, technology, and other relevant disciplines, has little to contribute toward resolving environmental problems. The alternative to looking to science for some quick fix is not looking instead to philosophical ethics.

How we understand the world, and therefore how and what we value, is significantly shaped by what science tells us about that world. The only serious alternative is to recognize that both science and ethics are essential if we hope to make meaningful progress in meeting the environmental challenges that confront us. We can capture this perspective by adapting an old philosophical adage: "Science without ethics is blind; ethics without science is empty." This book surveys the variety of ways in which philosophers seek to provide such a vision for environmental science and for environmental policy.

Most of this text focuses on the first half of this adage: without an ethical vision to guide environmental policy, science and technology at best can only provide haphazard success. Given that emphasis, perhaps it will be useful at this point to review briefly some reasons why it would be equally risky to rely exclusively on ethics and philosophy for guidance.

This text assumes that philosophical ethics can make significant contributions to environmental studies. It also assumes that the best of these contributions must be informed by environmental science. However, many philosophers would deny the relevance of science to issues of philosophical ethics. In their view, the primary role of the philosopher is to articulate and defend some abstract theory or principle. Only in a secondary sense might the philosopher then apply this theory to some practical issue such as the environment.

Because this book rejects such an abstract view of ethics, a helpful first step in understanding the relevance of ethics to environmental issues is to consider how empirical disciplines contribute to ethics.

First, much of ethics is concerned with offering and defending normative judgments; for example, "Deforestation of tropical forests is wrong," "Continued depletion of natural resources is irresponsible," "Sustainable agriculture is praiseworthy." But surely it is irresponsible, if not irrational, to make such judgments without a firm grasp of the facts. If you lack a clear understanding of the ecological effects of deforestation, or the extent of resource depletion, or the biology of pesticide-free farming, you are in no position to take a stand for or against such practices. To avoid offering irrelevant and irresponsible advice, environmental ethics must be grounded in the facts of environmental science.

Second, even the ability to recognize and understand an ethical issue *as* an ethical issue depends on information provided by empirical sciences. The more we learn about such issues as global warming, ecosystem ecology, and toxic waste disposal, the more likely we are to discover ethical issues and ethical complexity. Naive and simplistic ethical judgments, including the judgment that no ethical controversy exists, can often be traced to naive and simplistic understandings of the facts.

Third, ethical analysis as practiced by philosophers is a fairly abstract enterprise. Philosophers deal with such general concepts as "rights," "justice," "goodness," and "respect." But these abstract concepts provide little practical guidance unless they are given specific interpretations, interpretations that can only be "filled out" in specific contexts. The meaning and implications of "individual freedom" applied to people living in isolation in the wilderness are quite different from their meaning when applied to people living in New York City. The "right" of private property will have a meaning to a hunter-gatherer society different from its meaning to an industrialized, capitalistic society. Translating ethical concepts from the abstract to the more practical level requires knowledge of particular social and scientific facts.

Finally, there is a standard formula to which philosophers refer when discussing this issue: "Ought implies can." This formula suggests that it makes little sense to discuss what we ought to do if we don't understand what can be done. We cannot reasonably hold people responsible for doing what is impossible, and we surely can't blame them for failing to do what they cannot do. To know what can and cannot be done, in turn, requires that we know a good

deal about what human beings are like. In more general terms, it requires us to know a good deal about human nature.

For some philosophers, studying human nature is a purely conceptual matter. They say philosophy should abstract from particular human characteristics a common "essence" shared by all humans. This essence, which admittedly not all people manifest (it remains a human "potential" in other people), serves as the standard for ethical evaluation and prescription. More often, philosophical claims about human nature are grounded in a careful, and scientific, study of what humans actually are like. Aristotle, for example, thought the study of biology and psychology was essential for thinking about ethics. This required, at a minimum, knowledge of basic human needs, common capabilities and potentials, human motivation, and so on. In short, there is an important role for the sciences, both social and biological, to play in supplementing the philosophical account of what human beings are like.

Of course, this does not mean that philosophical appeals to human nature, even those firmly grounded in science, are without problems. Sometimes, what is taken to be an essential truth about human nature turns out to be more a result of cultural bias and limitation. It is difficult to read Aristotle's discussions of the "nature" of women and "natural slaves," for example, without concluding that his ethical views were extremely limited by his own cultural assumptions about women and non-Greeks. It is equally difficult to read a philosopher such as Thomas Hobbes without recognizing how some modern views about human nature are also shaped by the political and economic forces of his time.

Three themes emerge from this point that are worth mentioning early in this book. First, we should be careful in discussing "nature" and "human nature." At best, these terms are very ambiguous and can be responsible for much unclear thinking. At worst, they can hide powerful and controversial claims under the disguise of uncontestable and simple observations. Given the central role that the concept of "nature" plays in many environmental discussions, the significance of this point cannot be underestimated. Philosophical appeals to "nature" that are not firmly grounded in scientific observations of the natural world, should be treated with suspicion. We should be equally suspicious of scientific or technological appeals to what is "natural." They, too, can contain hidden value assumptions that must be explicitly examined. Very often, it is assumed that because something is natural it must be good.

Second, we should be alert to the biases and limitations of our own common ways of thinking. As we shall see, some writers claim that certain environmental problems result from biases and hidden assumptions in some traditional philosophical and ethical theories. This is especially important to keep in mind when we begin to survey some of the recently emerging theories of environmental ethics. We also need to be equally alert to hidden value assumptions and prejudices in our own patterns of thinking.

These considerations do not deny the value of "pure" philosophical reasoning. Conceptual analysis and philosophical theorizing are two important contributions that philosophy can offer. Indeed, they are essential for any adequate resolution of environmental controversies. However, we cannot lose sight of the fact that ethics is essentially *practical*. It is concerned with how we should live, how we should act, and what kind of people we should become. Because ethics is essentially practical, it should not be used without paying close attention to empirical information about the world.

I began this section with the claim that the role of ethics is to provide a "vision" for environmentalism. I then reviewed some reasons why it would be misleading to think that this vision can come from a purely abstract ethical theory. At this point, let's look in more detail at the ways in which ethics can contribute to meeting environmental challenges.

1.4 WHAT IS ENVIRONMENTAL ETHICS?

In general, *environmental ethics presents and defends a systematic and comprehensive account of the moral relations between human beings and their natural environment*. Environmental ethics assumes that human behavior toward the natural world can be and is governed by moral norms. A theory of environmental ethics then must go on to (1) explain what these norms are, (2) explain to whom or to what humans have responsibilities, and (3) show how these responsibilities are justified.

A variety of environmental ethics emerge with differing answers to these questions. Some philosophers argue that our responsibilities to the natural environment are only indirect—that the responsibility to preserve resources, for example, is best understood in terms of the responsibilities that we owe to other humans. Other philosophers argue that we have direct responsibilities not only to plants and animals but also to ecosystems and species, and that these responsibilities are based on the moral standing of these natural

objects. Later chapters examine these answers in detail. First, however, we should think in more general terms about ethics itself.

1.5 DESCRIPTIVE ETHICS

Talk of "ethics" can sometimes be a bit confusing or intimidating. Ethical issues often involve our most fundamental commitments and values, and it is difficult to question these. Many people are also unwilling to do the careful and hard thinking that is necessary in ethics. Simply, philosophical ethics is something many people prefer to avoid, despite the fact that these same people regularly make ethical judgments. To help overcome this hesitance, it is useful to distinguish between different types of ethical judgment and ethical reasoning.

Sometimes when we speak of "ethics," we are simply describing the particular values and principles that someone holds. In this *descriptive* sense, "environmental ethics" refers to those values, whatever they turn out to be, associated with the environmental movement. As the name suggests, *descriptive ethics* involves describing, classifying, listing, and summarizing ethical beliefs.

It might seem that there is little of philosophical interest in descriptive ethics. Describing ethical beliefs might appear to be more the domain of social scientists and pollsters than of philosophers. However, one of the first and most serious challenges in any study of ethics involves identifying an issue *as* an ethical issue. We all need to be taught to recognize—and to practice recognizing—ethical issues. For example, some authors speak of different levels of "environmental consciousness"[6] which suggests that people will understand the world in different ways depending on their ethical and environmental sensitivity. One constant challenge for environmental ethics is to help people notice environmental problems that they might otherwise miss. Philosophy can help train us to recognize otherwise hidden issues.

For example, in the classic environmental essay "The Land Ethic,"[7] Aldo Leopold retells the story of Odysseus' return from the Trojan War. Odysseus hanged a dozen women slaves whom he suspected of misbehavior. Since slaves were seen as property, the Greeks apparently saw nothing ethically wrong with this action. Leopold uses this example to call for an "extension of ethics" to include human relations to the land. Just as Odysseus was ethically insensitive to the evil of killing innocent slaves, we fail to notice the wanton destruction of the land. Leopold's point is that to be capable of noticing an ethical issue, sometimes we need to work intellectually. At times we can be limited by our own perspectives on the world.

Uncovering the limitations of our own ethical and environmental consciousness is a regular theme in the following chapters. Such limitations may also turn out to be the cause of some of the frustration that characterizes ethical discussions and that therefore prevents us from following through on the careful thinking required in ethics. Many environmental controversies rest, at bottom, on very different perspectives for understanding the world. Few things are as frustrating as having our fundamental perspectives challenged. But we all need to be open to the possibility that, like Odysseus, we ourselves may suffer from ethical ignorance. A primary goal of *descriptive* ethics is to constantly stretch our understandings, shift our perspective and consciousness, and help us escape the limitations implicit in common ways of thinking.

1.6 NORMATIVE AND PHILOSOPHICAL ETHICS

A second aspect of ethical reasoning involves making ethical judgments, suggesting advice, and offering ethical evaluations. The type of ethical reasoning that most people associate with "ethics" is *normative ethics* (or "prescriptive," as opposed to "descriptive," ethics). Most ethical judgments that include an "ought" or "should" are normative claims. Normative judgments prescribe behavior; for example, "Endangered species ought to be protected," "Toxic wastes should not be dumped in less developed countries," and "Carbon dioxide emissions should be diminished." Normative judgments implicitly or explicitly appeal to some norm or standard of ethical behavior.

Many environmental controversies involve disputes of normative ethics. One side believes that people ought not kill endangered animals under any circumstances; the other believes that selective killing of some animals ("culling") is necessary to maintain an ecological balance. Both sides cite evidence and opinions in support of their judgments. No doubt much frustration that students experience with ethics arises because ethical discussions too often are left at this level, with disagreements and controversies abounding.

However, it is crucial that we not remain at the level of normative ethics. Resolving controversy requires us to step out of, or to *abstract* ourselves from, specific disagreements to examine the values in conflict and the competing reasons that underlie the conflict. Moving to this more abstract level of thinking is to move from normative to philosophical ethics.

The third aspect of ethical reasoning is *philosophical ethics*. Philosophical ethics is a higher level of generality and abstraction in which normative judgments and their supporting reasons are analyzed and evaluated. This is the level of the general concepts, principles, and theories to which one appeals in defending and explaining normative claims. And this is the level at which philosophers are most at home and have most to offer. Very generally, evaluating reasons that support or criticize a normative judgment, or seeking to clarify the concepts involved, is the essence of philosophical ethics. "Environmental ethics," in this sense, is a branch of philosophy involving the systematic study and evaluation of the normative judgments that are so much a part of environmentalism.

This framework of *descriptive*, *normative*, and *philosophical* ethics provides an initial answer to the question "What is environmental ethics?" and also introduces the general goals of this text. Environmental ethics trains us so that we can begin to understand environmental problems in all their complexity, and it challenges us to escape the limitations of an uncritical ethical perspective. Environmental ethics describes the varied ways in which different people understand the world (the different levels of "environmental consciousness"). In the study of environmental ethics, we are presented with a multitude of normative judgments and are asked to evaluate the evidence and reasons offered in support of these claims. In assessing this evidence, we typically must move to a more abstract and general level of analysis. At this more philosophical level, we are often asked to locate these specific normative claims in a more general philosophical context or theory. We examine and evaluate the philosophical assumptions that underlie these claims and perspectives. Finally, environmental ethics can involve "theory building" by articulating and defending a systematic and unified ethical perspective from which one then can generate and defend specific normative judgments. We will be engaged in these projects throughout this text.

1.7 SUMMARY AND CONCLUSION

A "story within the story" is told in this text. The primary emphasis of this book is to survey the wide variety of contributions that philosophers have been making to environmental debates. These represent the philosophical "visions" being offered to environmental scientists and policymakers. But within this story is a description of how philosophical ethics itself is challenged and extended by its encounter with the contemporary environmental and ecological crisis.

For many philosophers, traditional philosophical theories have proven inadequate to resolve environmental controversies. Thus, this book introduces philosophical ethics as an ongoing intellectual activity. It is an activity in which students are encouraged to become active participants, rather than passive observers.

Notes

1. For a discussion of cleanup technologies, including the use of hot water washing used during the *Exxon Valdez* cleanup, see "Soiled Shores," by Marguerite Holloway, *Scientific American* 265, no. 4 (October 1991): 102–116.
2. E. O. Wilson offers such estimates in a number of places. See, for example, "Threats to Biodiversity," in *Scientific American* 261, no. 3 (September 1989): 108–116.
3. Jane Mansbridge's *Beyond Self-Interest* (Chicago: University of Chicago Press, 1990) is a helpful collection of essays on this topic.
4. See, for example, Daniel Botkin, *Discordant Harmonies* (New York: Oxford University Press, 1990), for a critique of a mechanistic view of science from an ecological perspective.
5. Amory Lovins, "Technology Is the Answer (But What Was the Question?)," in G. Tyler Miller, ed., *Environmental Science*, 3d ed. (Belmont, CA: Wadsworth, 1991), pp. 56–57.
6. See, for example, John Rodman, "Four Forms of Ecological Consciousness Reconsidered," in Donald Scherer and Thomas Attig, eds., *Ethics and the Environment* (Englewood Cliffs, NJ: Prentice-Hall, 1983).
7. Aldo Leopold, *A Sand County Almanac with Essays on Conservation from Round River* (New York: Oxford University Press, 1949).

Discussion Questions

1. Reflect on some environmental controversy that recently has made news. Identify some of the ethical issues involved in this controversy. What makes an issue an *ethical* issue, anyhow?
2. Identify as many different uses of the words *natural* and *nature* as you can. Which, if any, have value connotations? Are all things that are "natural" also good? What about "human nature"? What is "natural" about human beings? What is not?
3. What makes "good" science? What is the difference between good science and bad science? What values distinguish good from bad science?
4. How should cleanup decisions, such as those made in the *Exxon Valdez* accident, be determined? Should the public be involved, or should these decisions be left to experts? Should local citizens have a direct voice, or is representation by such public agencies as the EPA sufficient? On what grounds do you defend your answers?
5. What sort of evidence is used to support controversial scientific claims? What sort of evidence is used to support controversial ethical claims? How is reasoning in science different from reasoning in ethics? How is it alike?

6. Should human behavior toward nonhuman natural objects be governed by ethical norms? Do we have any direct responsibility toward natural objects?

For Further Reading

The single best source for philosophical discussions of environmental issues is the journal *Environmental Ethics*.

James Rachels, *The Elements of Moral Philosophy* (New York: Random House, 1986), is a clearly written and philosophically substantive introduction to ethics.

G. Tyler Miller, *Living in the Environment*, 6th ed. (Belmont, CA: Wadsworth, 1990), is the single best introductory textbook to environmental science.

Daniel Botkin, *Discordant Harmonies* (New York: Oxford University Press, 1990), provides an insightful analysis by a scientist of how cultural myths and metaphors have shaped our understanding of the natural world.

Donald VanDeVeer and Christine Pierce, *People, Penguins, and Plastic Trees* (Belmont, CA: Wadsworth, 1986), and Tom Regan, ed., *Earthbound: New Introductory Essays in Environmental Ethics* (New York: Random House, 1984), are still among the best available collections of essays on environmental ethics, although they are slightly outdated given what has been written in the past few years.

Lynton Caldwell, *Between Two Worlds* (New York: Cambridge University Press, 1990), is a recent examination of the interplay of science, the environment, and public policy.