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***Environmental Regulation***  
**Law, Science, and Policy**

*Seventh Edition*

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|| *Environmental Values and  
Policies: An Introduction* ||

Today's mainstream environmentalism—aptly characterized as incremental and pragmatic “problem solving”—has proven insufficient to deal with current challenges and is not up to coping with the larger challenges ahead. Yet the approaches of modern-day environmentalism, despite their limitations, remain essential: right now, they are the tools at hand with which to address many very pressing problems.\*

—James Gustave Speth

If we listen to environmental debate, it will appear that there is even some kind of consensus regarding values. Yet when you scratch the surface, when individuals—executives, labor officials, factory workers, teachers, professional workers, farmers, traveling salesmen—begin to tell you their own life stories, their hopes, needs, feelings, and opinions, you get a glimpse of the complexity of the problem of values. Very often the same person holds contradictory attitudes. Values seem to arise from economic interests, yet many of the oldest and most deeply imbedded ones, like those prevalent for centuries in religious thought, enjoy an existence virtually independent of economic conditions. Attitudes toward [the environment] can be understood as only a small cluster in the vast constellation of values coming from hundreds of cultural sources—family, religion, economic beliefs, even personality and character.\*\*

—Joseph Petulla

The desire to ensure that present and future generations enjoy the benefits of both a prosperous economy and a healthy environment has become a universal aspiration that can provide common ground between remarkably diverse interests. The path for achieving this goal is often referred to as “sustainable development,” a concept that has broad public support, despite sharp disagreements over specific policies for pursuing it.

Since the late 1960s, spectacular growth in public concern for the environment has had a profound impact on the development of American law. During this period, U.S. environmental law has grown from a sparse set of common law precedents and local ordinances to encompass a vast body of state and federal legislation. Numerous federal and state agencies now implement these laws through complex regulations that affect virtually every aspect of our lives.

\*The Bridge at the End of the World 9 (2008).

\*\*American Environmentalism 3 (1980).

In addition, as environmental concerns increasingly transcend national boundaries, environmental law has now become an urgent priority around the globe.

U.S. environmental law has roots in many traditional fields of law, including torts, property, and constitutional law. Much of its continued evolution has been a response to perceived deficiencies of the common law as a vehicle for responding to new problems and new knowledge about the environmental effects of human activity. Chapter 2 explores the major sources of environmental law and provides an overview of the contemporary structure of the field. Throughout its development, environmental law has faced continual criticisms for not changing quickly enough. Such criticism comes both from those who think environmental law responds too weakly and too slowly to environmental problems as well as from those who think its requirements are unnecessarily burdensome and restrictive, forcing the public and private sectors to devote resources to problems that are either imaginary or overstated.

The United States and the world are now at a crucial moment in the development of environmental law, as the concern over the prospects of disruptive climate change from greenhouse gases mounts. The climate change problem, along with many more traditional environmental problems such as ground level air pollution, toxic waste generation, and water pollution, is inextricably linked to the carbon fuel cycle to which the economies of the world seem inextricably linked. If modern environmentalism has proven insufficient to cope thoroughly with its traditional problems, will it fall further short in addressing the issue of climate change? Even if insufficient to thoroughly cope with environmental problems, pragmatic approaches remain essential, Gus Speth concludes in the quotation that begins this chapter, because they are the tools we have at hand. You might say that environmental law faces two simultaneous problems. One involves reforming the tools at hand, to make them stronger and more sufficient. The other involves building structures, institutions, and rules sufficient for the more transformative demands of problems like climate change. This casebook explores the current regulatory instruments of environmental law and the criticisms that have been leveled against those instruments from different perspectives. It also examines the possibility that these instruments, while essential, have to be supplemented in significant ways if we are to meet the environmental demands of the twenty-first century.

This chapter begins by exploring some of the fundamental traditions of thought and attitude that form contemporary views regarding the environment. There is broad agreement that some forms of collective action are necessary to address some environmental problems. At the same time, the diversity of diagnoses about how environmental law needs to change intimates that there are also areas of fundamental disagreement about the concrete form such collective action should take.

## A. ENVIRONMENTAL PROBLEMS AND PROGRESS

The domain of environmental law and policy extends to any place where the earth is modified by human action. Some of today's environmental problems

have been around for centuries. Lead poisoning from wine goblets affected the Roman Empire. The Ancestral Pueblo peoples of the American Southwest intensively used and eventually depleted the natural resources of the mesas upon which they built their cliff dwellings.

Others are new. Synthetic organic compounds and nuclear power did not exist prior to World War II. Still others are old problems with new consequences caused by great increases in scale. In the past 50 years we have added more people and more pollutants to the planet than in the preceding 10,000 years. As just one illustration, the amount of carbon emissions from fossil fuel burning—a major contributor to climate change—has grown from practically nothing at the start of the Industrial Revolution to 500 million tons at the start of the 20th century to 1.6 billion in 1950 to 8.3 billion in 2007. Ecologist Eugene F. Stoermer and Nobel prize-winning atmospheric chemist Paul Crutzen argue that human impact on Earth's ecosystems has been so extensive that we have entered a new geologic epoch that should be called the anthropocene. This epoch would signify a time when humans became the dominant influence on the planet's natural systems. Some scientists believe the anthropocene should date from the Industrial Revolution of the late eighteenth century; others maintain that it should start much earlier, with the rise of human agriculture.

John Holdren and Paul Ehrlich are credited with first suggesting that the impact (I) that human behavior has on the environment results from the combined effect of population size (P), the level of affluence (A), and the type of technologies (T) that enhance our abilities to consume resources. Paul Ehrlich & John Holdren, *Impact of Population Growth*, 171 *Science* 1212-1217 (1971). This  $I = PAT$  formula ignores interdependencies and other complicating factors, but it does identify three significant elements that give rise to environmental issues.

The global population has increased from 3.85 billion in 1972 to 7.08 billion in 2013, U.S. Census Bureau, U.S. and World Population Clocks, electronic database, updated April 1, 2013, <http://www.census.gov/main/www/popclock.html>, and the United Nations Population Division estimates it is growing at the rate of 77 million people per year. Increases in population change land use patterns, consume more nonrenewable natural resources such as fossil fuels, intensify land uses such as agriculture, and produce more pollution. The group of individuals adversely affected by health-related environmental factors also increases as total population increases. For example, despite the fact that the percentage of the world's population served with water supplies that have been treated or improved grew from 79 percent in 1972 to 89 percent in 2010, over 900 million people now lack access to safe drinking water, and 2.5 billion lack adequate sanitation. As a consequence, more than 3 million people in developing countries die every year from water, sanitation, and hygiene-related causes. Air pollution from particulate matter and ozone causes more than 6 million premature deaths annually. UNEP, *Global Environmental Outlook-5* at 3 (2012).

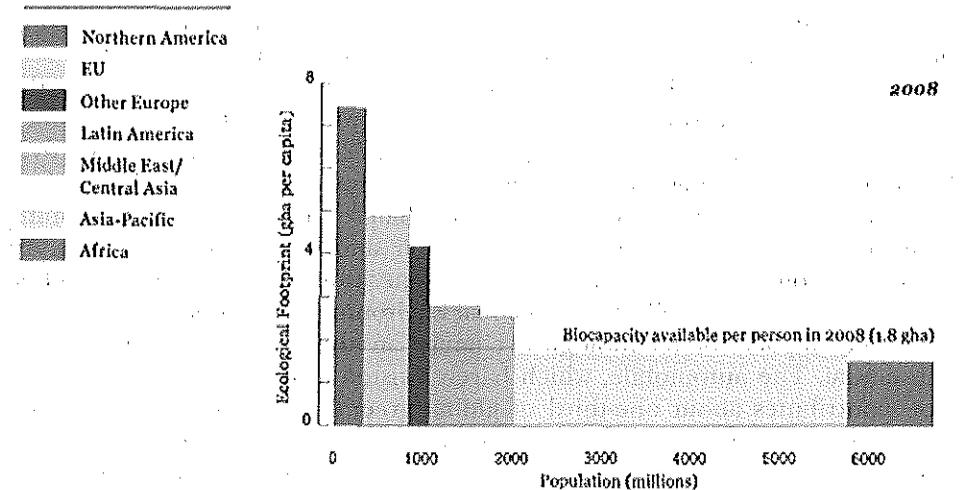
The impacts of technological change on the environment have been substantial. The automobile, which barely existed at the turn of the century, now contributes about one-third of global greenhouse gases and is a major source of some of the most harmful air pollutants. Technological improvements such as sonar and vast drift nets give fishing fleets the ability to wipe out ocean fisheries—a real concern in light of the fact that two-thirds of the world's marine

fisheries are currently considered over-exploited by the FAO. The development of plastics has facilitated growth in the throw-away economy, increasing per capita waste generation significantly.

The role of affluence can be illustrated through the idea of an Ecological Footprint. Developed by the World Wildlife Fund (WWF) and others, the Ecological Footprint provides a measure of the human pressures being placed on global ecosystems. It estimates how much productive land is required to produce food and wood, to build and maintain human infrastructure, and to absorb the carbon dioxide people generate from energy production, expressing that estimate in terms of a "global hectare," or a hectare of land with biological productivity equal to the global average. The per capita footprint for the United States was 7.19 in 2011 compared to 2.13 for China. Both figures exceed the global "break even" standard of 1.78. WWF, 2012 Living Planet Report at 142, 144. The dotted line in Figure 1.1 shows how much each region is exceeding (or is under) its biocapacity.

Society and government have not been silent in the face of increasing human pressures on the global ecosystem. Since the early 1970s, national, international, state, and local governments have been responding to the increased human pressure on the environment in a wide variety of ways. At the international level, agreements and programs aimed at reducing adverse environmental impacts of human activity have proliferated. Beginning in 1972, a series of once-a-decade environment summits have provided a focal point for these efforts. These summits began with the United Nations Conference on the Human Environment in Stockholm in 1972 and now extend through to the United Nations Conference on Sustainable Development held in Rio de Janeiro in June 2012, also known as Rio+20 because it occurred 20 years after the Rio Earth Summit in 1992.

FIGURE 1.1  
Ecological Footprint and Biocapacity by Region 2008



Source: World Wildlife Fund for Nature, Living Planet Report 2012 at 55, [www.panda.org](http://www.panda.org)

National and local environmental efforts have been equally impressive. Again, the early 1970s were a catalytic period, with the first Earth Day, April 22, 1970, symbolically marking the beginning of the modern environmental era. In the United States, a structure of national legislation sprang into place in a remarkably short period of time, and the Environmental Protection Agency was established to administer many of the new laws and regulations. For an overview of these developments, see Mary Graham, *The Morning After Earth Day* (1999) and Richard J. Lazarus, *The Making of Environmental Law* (2004). Today, we have a complex array of rules and regulations aimed at mitigating adverse environmental effects, the implementation of which now annually costs the private sector approximately \$200 billion per year.

The world's policy responses have had positive effects. For example, air quality in the United States has generally improved, notwithstanding increases in population and Gross National Product. EPA reports that emissions of carbon monoxide, 60 percent of which come from automobiles, have fallen by 68 percent from 1980 to 2010, even though vehicle miles traveled increased by 94 percent during the same time period. EPA, *Air Quality Trends* ([www.epa.gov/airtrends.html#comparison](http://www.epa.gov/airtrends.html#comparison)). Controls on the use of lead additives have been even more successful: Emissions of lead fell 94 percent between 1981 and 2000. Internationally, global average life expectancy has been extended by ten years since 1972, with some of this improvement clearly due to reduction in environmental health risks.

The Ecological Footprint proves a helpful summary statistic for our current environmental situation. The good news is that the global per capita footprint is now growing at a slower rate than population growth—1.6 percent per year since 1985 versus 1.8 percent per year before then. We have begun, it would seem, to take steps to reduce the pressures that population growth puts on the global ecosystem. More disturbing, however, is news that the World Wildlife Fund and others believe that our present levels of use exceed the maximum footprint that the earth can sustain indefinitely, which they estimate to be 1.78 global hectares per capita, based on 2008 population figures. According to the WWF, we have been overshooting the capacity of the world to sustain existing population levels since 1980. In 2008, we overshoot the earth's biological capacity by more than 50 percent. WWF, *2012 Living Planet Report* at 8. Continued ecological deficits of this kind will lead to a gradual depletion of the earth's capital stock, and is inconsistent with the objective of sustainable development that is now embraced in one form or another by almost all environmental organizations.

The United States' footprint grew 21 percent between 1992 and 2005, an unacceptable rate of growth for a country already consuming more than twice its own biocapacity. In the years to come, the growth of India and China will place even greater pressures on the earth's resources. Should these two countries reach a per capita footprint level equal to Japan's, the world's entire bioresources would be consumed by just these two countries. World Watch Institute, *State of the World 2006* at 18 (2006).

Prior to the Rio+20 summit in June 2012, the United Nations Environment Programme (UNEP) published its fifth edition of the *Global Environmental Outlook* (GEO-5). The report assessed progress that had been made in addressing 90 previously identified environmental goals. It found that significant progress had been made in responding to only four of them: eliminating the production

and use of substances that deplete the ozone layer, removal of lead from fuel, increasing access to improved water supplies, and boosting research to reduce pollution of the marine environment. See [www.unep.org/geo/pdfs/geo5/Progress\\_towards\\_goals.pdf](http://www.unep.org/geo/pdfs/geo5/Progress_towards_goals.pdf). The report found that some progress had been made with respect to 40 other goals, including the expansion of protected areas such as National Parks and efforts to reduce deforestation. Little or no progress was found for 24 goals, including responding to climate change, protecting fish stocks, and reducing desertification and drought. For 8 goals, including protection of coral reefs, continued deterioration was found and a lack of data precluded an assessment of progress toward 14 other goals. For a complete list of the goals and UNEP's assessment of progress, go to [www.unep.org/geo/pdfs/geo5/Progress\\_towards\\_goals.pdf](http://www.unep.org/geo/pdfs/geo5/Progress_towards_goals.pdf).

The majority of modern environmental problems share one or more of a set of characteristics that makes them important and difficult problems. Many involve potentially catastrophic and often irreversible adverse effects that can be spread across large areas, populations, and time periods in ways that makes collective action to solve them essential. At the same time, there is great uncertainty about the mechanisms and effects of actions affecting the environment, so that debate over whether or not activities are actually causing substantial harm is often intense. There is also great resistance to actions aimed at solving them, sometimes because the economic costs are concentrated among a powerful few, sometimes because the costs involve lifestyle changes among the many.

One imperative of the modern environmental era has been to improve our understanding of the environment and the effects of human action on it, so as to chip away at the uncertainties just mentioned. As we learn more about such cause and effect relationships, we sometimes conclude that adverse effects are worse than supposed, in some cases meaning that even substantial gains in addressing a problem need to be pushed further. Lead concentrations in the environment are an outstanding example. Despite the elimination of lead from gasoline, and the ban on lead in paint and plumbing, which have drastically reduced new sources of lead pollution, more than 400,000 children in the United States still have lead levels high enough to be of medical concern. A major reason for this is our improved understanding of the adverse effects of low levels of lead exposure on neurodevelopment, which has prompted the Centers for Disease Control to lower its action levels for lead several times since the 1970s.

There are reasons to think that further environmental progress will be increasingly difficult. For one thing, we have taken a number of steps that lay along the path of least resistance, going after obvious environmental problems where remedial steps were relatively manageable. Rivers literally on fire because of the oil and chemical film on their surface, lakes suffocating from massive algae blooms, dense clouds of smog over cities, and odors from open solid waste dumps cried out for attention. Improving environmental quality by picking off such "low-hanging" fruit was clearly the correct first step, but by and large the actions taken to redress such obvious problems have proven insufficient to bring the quality of our environment to where we wish it to be. Progress from here on confronts tougher problems.

In the United States, environmental policy has become a much more partisan political issue than it was in the 1970s, when the major environmental laws passed Congress with wide bipartisan support. Republicans in Congress are

now much less likely to support environmental initiatives than Democrats. This is a reflection of the fact that further actions to improve the environment are more difficult and more costly, and it is also a contributing element to the difficulty of making further progress, as legislative compromises are frequently elusive.

The increasingly partisan nature of environmental debate marks the current political landscape despite the fact that public opinion surveys throughout the modern environmental era have registered strong support for environmental quality, to such a degree that public opinion analysts once labeled the environment "a consensual issue," Dunlop, *Public Opinion and Environmental Policy*, in *Environmental Politics and Policy* 87, 98 (J. Lester ed., 1990), with the "expectation of a clean environment" deemed to have evolved into "a virtual norm." Greenberg Research Memorandum to League of Conservation Voters and Sierra Club, Jan. 30, 1997. Although public support for environmental protection remains high, it appears to have eroded somewhat in the wake of the global financial crisis of 2008. In April 2013, the Gallup polling firm reported that only 47 percent of the public believed that the U.S. government is doing "too little" to protect the environment, down from 62 percent in 2006, while 16 percent believe the government is doing "too much," an increase from 4 percent in 2006. Frank Newport, *Nearly Half in U.S. Say Government Environmental Efforts Lacking*, Gallup Politics (<http://www.gallup.com/poll/161579/nearly-half-say-gov-environmental-efforts-lacking.aspx>). Given that this period encompassed some environmental and climate-related catastrophes, including the 2010 Deepwater Horizon oil spill, the 2011 Fukushima Daiichi nuclear accident, and Hurricane Sandy's devastation of the northeast United States in 2012, these poll results may surprise some environmentalists.

Partisanship over the environment does not typically express itself as disagreement about whether or not environmental quality is an important goal. Instead, the battles over further environmental initiatives focus on whether they are effective, as well as whether or not they come at too high a cost to other values, including private property rights, economic growth, and individual freedom. The costs and benefits of environmentally damaging behavior frequently fall on quite distinct groups of people; the beneficiaries of a cement factory's production and profits are typically distinct from the downwind communities affected by the plant's air pollution, for example. Similarly, the costs and benefits of environmental improvements typically create different groups of winners and losers. This makes for difficult political decision making, especially as proposals for further improvement become more and more expensive.

## B. AMERICAN ENVIRONMENTALISM: SOURCES AND VALUES

Samuel Hays has argued that changes in environmental values are part of a still larger complex of changes in social attitudes and values:

[Changes in environmental attitudes] are but one aspect of massive social changes that include television and the computer, new realms of production

beyond manufacturing, new attitudes about the relationships between men and women, new levels of income and education, and new intensities of information acquisition and exchange. . . .

While one could easily focus on the crisis aspect of pollution problems (and this usually was the tone of media coverage), on a more fundamental level the notion of pollution as a problem arose far more from new attitudes that valued both smoothly functioning ecosystems and higher levels of human health. . . .

While preventive medicine had made impressive accomplishments in vaccination against infectious diseases, it now seemed to be less interested in the limitations on optimum health that might come from environmental causes. . . . Hence, a major aspect of the public's concern for chemical pollution was either to take matters into their own hands and avoid contaminants by means of new personal lifestyles, or to demand public action to prevent exposure. [S. Hays, *Three Decades of Environmental Politics*, in *Government and Environmental Politics* 19, 20, 25, 35 (M.J. Lacey ed., 1989).]

Expanding on Hays, is it fair to conclude that the concept of "adverse environmental impact" is to an important degree a matter of perceptions, informed by some set of values, and not purely a feature of the physical world? For instance, is it right to think that when some people affirm wilderness preservation and see great environmental harm from cutting down trees, while others affirm forest land as a productive human resource and see little environmental harm from cutting (perhaps followed by reforestation), their disagreement rests in part on a disagreement about values?

Physical alterations of the world are not matters of perception alone, of course. Still, humans interact with the world in two ways relevant to environmental policy. Their physical actions alter the world in measurable ways, and they also organize, categorize, and evaluate that world through the conceptual schemes and value perspectives they inhabit. This understanding of the role of values in interpreting the world suggests that terms like "adverse environmental impacts" and "environmental problems" are concepts constructed by and of human beings. Different value perspectives may construct a term differently, and hence different worldly phenomena may be included within it.

Indeed, American environmentalism comprises a mix of value systems, beliefs, and perspectives, and draws on a complex of historical, philosophical, and religious traditions. This diversity will not always be apparent: In the policy context, differences in perspective may often be masked from view by a shared consensus that a certain state of affairs deserves attention. After proposals to dam the Grand Canyon surfaced in the 1960s, for example, opposition to the idea was waged on economic grounds, on conservationist grounds, on cultural-historical grounds, on Deep Ecological grounds, as well as others. Because consensus existed at the programmatic level of opposition to the dam, dissecting differences in the underlying rationale for that opposition was superfluous to the process of building a political coalition to fight the project; indeed, such dissection might actually inhibit such coalition-building.

Such consensus will not always exist, however. The economic perspective on environmental value, the conservationist perspective, and the Deep Ecological perspective strenuously disagree about the nature of the environmental problem posed by logging old-growth forest in the Pacific Northwest, for instance. Consensus among environmentalists often falls apart over the question

of remedy: Should the country's response to toxic air pollutants consist of efforts to reduce emissions to their optimal level—the point at which further reduction costs more than the human health and welfare gains from such reduction—or should it consist of strategies aimed at achieving zero emissions, and if the latter, how quickly? Should animal experimentation be permitted when the information gained will serve human needs, only when it will serve vital human needs, or not at all? Remedial questions often expose underlying value disagreements because they press advocates to articulate their vision of a properly functioning economy or society. Many of the issues joined in this text can be better understood by seeing how different perspectives within environmentalism urge different solutions to problems.

Environmental values can be distinguished in many ways. One fundamental division separates perspectives depending on whether their main object of moral or ethical concern is humankind, living things (with a further division between approaches that place high value on all living things versus some smaller set of living things, such as all mammals or all animals capable of experiencing pain), or entire ecosystems. These are referred to as human-centered (or anthropocentric), bio-centered, and eco-centered, respectively. Economics supplies the human-centered perspective most influential in contemporary policy debates. The scientific discipline of ecology provides the intellectual framework for some of the most influential bio-centered and eco-centered approaches. We will return to each of these in more detail after canvassing the large landscape of values influencing environmental thinking today.

A great deal of writing about environmental philosophy views all human-centered approaches to ethics or morals as seriously insufficient. Some rule out classifying a human-centered ethic as an environmental ethic at all, preferring to reserve the latter name for any "ethic which holds that natural entities and/or states of affairs are intrinsically valuable, and thus deserve to be the object of our moral concern," irrespective of whether they are useful or valuable to us in meeting our needs. Thompson, *A Refutation of Environmental Ethics*, 12 *Envtl. Ethics* 147, 148 (1990). Defined this way, only bio-centered or eco-centered ethics qualify.

Consider, for example, Aldo Leopold's land ethic. Building on an understanding of humanity as but one part of a dynamic ecosystem, Leopold wrote that "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." A. Leopold, *A Sand County Almanac* 201, 224-225 (1968). Much of Leopold's work was devoted to expressing the value of aspects of the environment that had no obvious economic value. "To sum up," he wrote, "a system of conservation based solely on economic self-interest is hopelessly lopsided. It tends to ignore, and thus eventually to eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning. It assumes, falsely, I think, that the economic parts of the biotic clock will function without the uneconomic parts." *Id.* at 213. Leopold plainly thought that polluting discharges may "tend otherwise" at levels well below those that are optimum from the economic perspective. For Leopoldians, the environmental problem of pollution can arise in situations in which the economic perspective would see no problem.

In particular, Leopold and other ecologists tend to believe that the scale of man's actions constitutes its most destructive quality. "The combined evidence of history and ecology seems to support one general deduction: the less violent the man-made changes, the greater the probability of successful readjustment in the [ecosystem]. Violence, in turn, varies with human population density; a dense population requires a more violent conversion. In this respect, North America has a better chance for permanence than Europe, if she can contrive to limit her density." *Id.* at 220. From the economic perspective, in contrast, large-scale disruptions of natural order are not necessarily to be avoided; it all depends on what costs and benefits to human beings are associated with those disruptions.

In recent years, the science of ecology has had an influence on both human-centered and bio-centered systems of environmental values. NEPA's call for "systematic, interdisciplinary" analysis of "the profound impact of man's activity on the interrelationships of all components of the natural environment" is very much a call with ecological origins. Ecology's central orientation is to view "living organisms and this nonliving (abiotic) environment [as] inseparably interrelated and interact[ing] upon each other." E. Odum, *Fundamentals of Ecology* 10 (2d ed. 1959). Ecological study provides a warning that if humans want to retain the relatively hospitable surroundings the earth has so far provided, we must become much more cognizant of the ecological ramifications of our actions. Leopold's land ethic evolved from his reflections as an applied ecologist studying the diversity and resilience of local ecosystems.

Perhaps most significant, seen as a way of understanding the human-environment relationship, ecology serves as a unifying thread for a number of different biocentric and ecocentric points of view. Its stress on relationships among mutually dependent components lends itself to an emphasis on harmony and cooperation that a variety of perspectives have found congenial. Leopold's land ethic is the starting point for many contemporary efforts to develop a picture of ethical behavior that is not centered on humans. For an investigation of the land ethic's meaning and its influence, see *Companion to A Sand County Almanac* (J.B. Callicott ed., 1987).

Religious values also play significant roles in environmental perspectives. The relationship between Western religions and the environment has been particularly controversial. In 1967, Lynn White wrote an influential essay in which he argued that much of the blame for our current situation rests with the biblical account of the Creation, in which God set humankind apart from the rest of creation, gave men and women dominion over creation, and instructed them to subdue it. White, *The Historical Roots of Our Ecological Crisis*, 155 *Science* 1203 (Mar. 10, 1967). White's analysis was supported soon thereafter in John Passmore's *Man's Responsibility for Nature* (1974).

Among the world's religions, the Judeo-Christian tradition has often seemed to fare the worst in terms of its alleged association with beliefs inhospitable to environmental protection. The dominion tradition, however, has been responded to by others who retrieve the biblical tradition of stewardship as a counterweight to the views of White and Passmore. In January 1990, for example, Pope John Paul II issued a message entitled "Peace with All Creation." In it he explained that alongside the arms race, regional conflicts, and domestic injustice, world peace is threatened "by a lack of due respect for nature, by the

plundering of natural resources and by a progressive decline in the quality of life." Throughout the message, the Pope employed the vocabulary of ecology.

[A] new ecological awareness is beginning to emerge which, rather than being downplayed, ought to be encouraged to develop into concrete programs and initiatives. . . . The profound sense that the earth is "suffering" is shared by those who do not profess our faith in God. Indeed, the increasing devastation of the world of nature is apparent to all. It results from the behavior of people who show a callous disregard for the hidden, yet perceivable requirements of the order and harmony which govern nature itself.

People are asking anxiously if it is still possible to remedy the damage which has been done. Clearly, an adequate solution cannot be found merely in a better management or more rational use of the earth's resources, as important as these may be. Rather, we must go to the source of the problem and face in its entirety that profound moral crisis of which the destruction of the environment is only one troubling aspect. . . . Theology, philosophy and science all speak of a harmonious universe, of a "cosmos" endowed with its own integrity, its own internal, dynamic balance. This order must be respected. The human race is called to explore this order, to examine it with due care and to make use of it while safeguarding its integrity.

More recently, Christian evangelicals concerned about the environment have begun organizing under the banner of "creation care," which they state "will be rooted in their faith in a divine creator, driven by their concern for the health of families and children, and tempered by the traditional evangelical skepticism of liberal, big-government solutions." John Cochran, *New Heaven, New Earth*, *CQ Weekly*, p. 2768 (Oct. 17, 2005). In 2004, the Evangelical Environmental Network published an Evangelical Declaration on the Care of Creation, which states:

Because we worship and honor the Creator, we seek to cherish and care for the creation. . . . Because we await the time when even the groaning creation will be restored to wholeness, we commit ourselves to work vigorously to protect and heal that creation for the honor and glory of the Creator—whom we know dimly through creation, but meet fully through Scripture and in Christ. We and our children face a growing crisis in the health of the creation in which we are embedded, and through which, by God's grace, we are sustained. Yet we continue to degrade that creation.

These degradations of creation can be summed up as 1) land degradation; 2) deforestation; 3) species extinction; 4) water degradation; 5) global toxification; 6) the alteration of atmosphere; 7) human and cultural degradation. Many of these degradations are signs that we are pressing against the finite limits God has set for creation. With continued population growth, these degradations will become more severe. Our responsibility is not only to bear and nurture children, but to nurture their home on earth. We respect the institution of marriage as the way God has given to insure thoughtful procreation of children and their nurture to the glory of God. We recognize that human poverty is both a cause and a consequence of environmental degradation.

Available at <http://www.creationcare.org/>. In 2005, leaders of the National Association of Evangelicals (NAE) undertook to develop a consensus statement specifically on climate change. This effort revealed fissures within the Christian

conservative community, with some supporting a strong statement calling for policy change to reduce greenhouse gases and others endorsing the skepticism of the Bush Administration toward the issue and its approach of urging voluntary actions to reduce those gases. In early 2006, the president of the NAE retreated from the goal of a consensus statement because of the “wide divergence” of views within the Christian conservative movement. Some Evangelicals Plow Ahead on Climate Amid Conservative Opposition, *Inside EPA*, Feb. 7, 2006. Ultimately, 86 evangelical leaders, but not the NAE itself, endorsed an “Evangelical Climate Initiative” calling for federal regulations to reduce emissions of greenhouse gases. Laurie Goodstein, *Evangelical Leaders Join Global Warming Initiative*, *N.Y. Times*, Feb. 7, 2006. They signed a statement arguing that “millions of people could die in this century because of climate change, most of them our poorest global neighbors.” *Climate Change: An Evangelical Call to Action*, available at <http://www.christiansandclimate.org/statement>. In December 2008, the NAE’s Washington lobbyist and key spokesperson on creation care, Richard Cizik, resigned from his position amidst continuing controversy within the evangelical leadership on the issue of climate change and the evangelical community’s relationship to it. Sarah Pulliam, *What Cizik’s Resignation Means for Creation Care*, *Christianity Today*, Dec. 18, 2008, <http://www.christianitytoday.com/ct/2008/decemberweb-only/151-21.0.html>.

Another distinctive value system whose influence you will see in American policy and law is that of the preservationist. Preservationists may emphasize historical continuity, within our culture, our traditions, and our relationships with the natural environment. They may, however, also demand the preservation of certain places because they provide the context and catalyst for contemporary revelation and self-understanding. “Why should we not also enjoy an original relation with the universe?” asks Emerson.

Why should not we have a poetry and philosophy of insight and not of tradition, and a religion by revelation to us, and not the history of theirs? Embosomed for a season in nature, whose floods of life stream around and through us, and invite us, by the powers they supply, to action proportioned to nature, why should we grope among the dry bones of the past . . . ? The sun shines today also. There is more wool and flax in the fields. There are new lands, new men, new thoughts. Let us demand our own works and law and worship.

Where are these insights found? By communing with nature itself, for “[u]ndoubtedly, we have no questions to ask which are unanswerable.”

We must trust the perfection of creation so far as to believe that whatever curiosity the order of things has awakened in our minds, the order to things can satisfy. . . . [N]ature is already, in its forms and tendencies, describing its own design. Let us interrogate the great apparition that shines so peacefully around us. Let us inquire, to what end is nature? . . . In the woods, we return to reason and faith. There I feel that nothing can befall me in life—no disgrace, no calamity (leaving me my eyes), which nature cannot repair. Standing on the bare ground—my head bathed by the blithe air and uplifted into infinite space—all mean egotism vanishes. I become a transparent eyeball; I am nothing; I see all; the current of the Universal Being circulates through me; I am part or parcel of God. [R.W. Emerson, “Nature” (1836), reprinted in *New World Metaphysics* 171, 171-174 (G. Gunn ed., 1981).]

The writings of Emerson, Thoreau, and other Transcendentalists firmly graft into American literary history the connection between spiritual renewal and nature, so that one recurring argument for wilderness preservation urges doing so "because our lives and our conception of ourselves will be enhanced—in a spiritual sense—if we learn to appreciate [nature] for what it is and we learn how to live in harmony with it." J. Thompson, *Preservation of Wilderness and the Good Life*, in *Environmental Philosophy* (R. Elliot & A. Gare eds., 1983).

These thoughts may misleadingly suggest that preservationists are necessarily human-centered thinkers, valuing nature for what it provides for the human spirit. For many in this tradition, nature is to be valued first for itself; it then turns out that human contemplation of nature proves a source of inspiration as well. This biocentric idea is well expressed by the naturalist John Muir, founder of the Sierra Club:

The world, as we are told, was made especially for man—a presumption not supported by the facts. . . . Now it never seems to occur to [many people] . . . that Nature's object in making animals and plants might possibly be first of all the happiness of each of them, not the creation of all for the happiness of one. Why should man value himself as more than a small part of the one great unit of creation?

Some argue that the kind of intrinsic value Muir attributes to nonhuman-kind supports the conclusion that those nonhumans possess rights that environmental policy ought to respect. David Brower, when he was chairman of the Sierra Club, expressed his agreement with Muir by announcing, "I believe in the rights of creatures other than man." However, animal rights advocates disagree over the precise source of those rights. Peter Singer and others argue for an animal welfare ethic, basing their views on the capacity of animals to experience pleasure and pain, and on that basis extending a human-centered ethic, Benthamite utilitarianism, to cover nonhuman species. See P. Singer, *Animal Liberation* (2d ed. 1990). Tom Regan, on the other hand, rejects the utilitarian approach and instead finds support for animal rights in the idea that living beings who have the capacity to experience life in certain qualitative ways (including having beliefs and desires, perceptions, memory, and a sense of the future) possess inherent value that gives them a right to respect, independent of the pleasures or pains they may experience. See T. Regan, *The Case for Animal Rights* (1983).

However wide the internal disagreements among these and other bio-centered or eco-centered ethics, they remain distinguishable from economics and other human-centered views in that they seek to articulate "not an ethic for the *use* of the environment, a 'management ethic,' but an ethic *of the* environment." J.B. Callicott; *The Case Against Moral Pluralism*, 12 *Envtl. Ethics* 99, 99 (1990). Professor Callicott, a University Distinguished Research Professor at the University of North Texas, predicted in 2013 that as climate change becomes more apparent, people in the future will wonder, "What were they thinking back at the turn of the century driving those CO<sub>2</sub>-belching hunks of metal around, often just for the hell of it?"

*ENVIRONMENTAL PHILOSOPHY: A PATHFINDER*

For those wishing to explore more of the historical development and diversity of American environmental thought, see S.P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (1959); R. Nash, *Wilderness and the American Mind* (1967); J. Petulla, *American Environmental History* (2d ed. 1988); R. Nash, *The Rights of Nature* (1989), which contains an excellent annotated bibliography; and P. Shabecoff, *A Fierce Green Fire: The American Environmental Movement* (1993).

A classic statement of the economic perspective on environmental issues is J.H. Dales, *Pollution, Property, and Prices* (1968). This perspective is also outlined in simplified form in W. Baxter, *People or Penguins: The Case for Optimal Pollution* (1974); R. Posner, *The Economics of Law* (1987); and A.M. Polinsky, *An Introduction to Law and Economics* (1983). Mark Sagoff has done some of the most interesting work critiquing the economic perspective on environmental issues. Much of his work is summarized in M. Sagoff, *The Economy of the Earth* (1988). J. Baird Callicott is the leading expositor of Leopold's land ethic. See his *In Defense of the Land Ethic* (1989) as well as his edited collection of essays, *Companion to a Sand County Almanac: Interpretive and Critical Essays* (1987).

Useful collections of essays in environmental philosophy include: D. Scherer ed., *Upstream/Downstream: Issues in Environmental Ethics* (1990); F. Ferre & P. Hartel eds., *Ethics and Environmental Policy* (1994); R. Attfield & A. Belsey eds., *Philosophy and the Natural Environment* (1994); M. Zimmerman et al., *Environmental Philosophy* (1998); M. Smith, *Thinking Through the Environment* (1989). Bill McKibben's books stress the significance of the loss of nature on the human spirit as well as on nature itself. B. McKibben, *The End of Nature* (1990); *Enough* (2004).

Many scholars have put forward their own approach to environmental philosophy. For good reviews and extensive bibliographies, see R. Attfield, *The Ethics of Environmental Concern* (2d ed. 1991); A. Dobson, *Green Political Thought*, ch. 1 & 2 (1998); N. Carter, *The Politics of the Environment*, ch. 2 (2001).

Much of the important literature in this rapidly developing field is contained in *Environmental Ethics*, a journal published quarterly by the Center for Environmental Philosophy at the University of North Texas. The center maintains a website devoted to environmental ethics at [www.cep.unl.edu](http://www.cep.unl.edu), which contains an excellent collection of resources. For additional web-based resources on environmental ethics, see <http://ethics.sandiego.edu/Applied/Environment/index.asp>.

General values that are not exclusively environmental in their focus play significant roles in the debate over environmental policy. A prominent characteristic of many environmental issues is that they impose costs or risks

on individuals that are not of those individuals' choosing. The residents of Love Canal did not choose to be exposed to toxic substances; citizens all over the world did not choose to run the risks of global warming. Undisclosed trace elements of carcinogens in food create risks to consumers that they did not choose. In a society such as ours, it is possible to argue that "the principal value informing public law for the workplace and the environment—as well as private behavior—may be *autonomy*, not *efficiency*." As Mark Sagoff explains, "people want to determine the background level of risk; they do not want the working conditions of their lives to be determined by others. It does not matter how cost-beneficial risks are; it is a question, rather, of who controls them." Sagoff, *On Markets for Risks*, 41 Md. L. Rev. 755, 761-762, 764 (1982).

The most important new current within the environmental movement is the environmental justice movement. The environmental justice movement challenges current environmental policy to shift to a new paradigm that would emphasize preventing vulnerable populations from being exposed to environmental risks, rather than simply managing, regulating and distributing such risks. Connecting environmental issues to a larger agenda of social justice, this movement focuses on the connections between discrimination, poverty, and the distribution of environmental risks. It argues that "low-income communities and communities of color bear a disproportionate burden of the nation's pollution problem" because the "environmental laws, regulations, and policies have not been applied fairly across all segments of the population." R. Bullard, *Unequal Protection: Environmental Justice and Communities of Color* xv (1994). In a relatively short period of time, environmental justice concerns have had a profound effect on the entire environmental movement. Sierra Club Executive Director Carl Pope has written that "the two major ethical streams in modern environmentalism are deep ecology and environmental justice," Pope, *An In-Depth Response to "The Death of Environmentalism,"* Jan. 15, 2005, even though the environmental justice movement was unknown until the 1990s. <http://www.grist.org/news/maindish/2005/01/13/pope-reprint>.

|| *Center for Progressive Reform:* ||  
|| *Perspective on Environmental Justice (2005)* ||

Although communities of color and the poor have been heavily and disproportionately affected by noxious and risk-producing environmental practices for decades, the issue of environmental racism did not gain national prominence until the 1980s. Several high-profile events brought national attention to the issue, including a demonstration against the siting of a hazardous waste landfill in a predominantly African-American county in North Carolina; a General Accounting Office report finding that, in one U.S. region, large, commercial hazardous waste facilities were more likely to be sited in African-American communities; and a national study finding a positive correlation between minority racial status and proximity to commercial hazardous waste facilities and uncontrolled waste sites. . . . [A] National Law Journal investigation also found racial disparities in the enforcement of federal environmental laws. Subsequent studies, mostly regional in scope, tend to reinforce many of the findings of this early research. . . .

Conclusive judgments about the reasons for all of the disproportionate environmental burdens borne by communities of color remain elusive. At the same time, researchers' fixation on causation . . . has deflected attention away from the more fundamental questions of whether, regardless of the cause, such marked inequality in risk distribution is to be condoned, and assuming it is not, what is to be done about existing disparities. These disparities persist not just in the siting of undesirable facilities but in a wide range of decisions affecting the environment, including standard setting, program design, enforcement, the cleanup of contaminated properties, and exclusionary regulatory processes. In the last 15 to 20 years, communities of color and poor communities, and organizations representing them, have persistently challenged disparities resulting from the current system. Numerous failings of the environmental regulatory system have been identified and challenged in recent years.

In the area of standard setting, EPA and other agencies employ scientific risk assessments to support environmental standards that often do not take into account the special characteristics of communities of color and low-income communities. For example, in developing water quality criteria, environmental agencies estimate an average fish consumption that ignores the higher rates of fish consumption among Native Americans and other ethnic minorities. . . . As a result of such inappropriate assumptions, agencies fail to propose standards that are sufficiently protective of vulnerable ethnic and racial groups. This lack of regulatory protection is then compounded by these groups' inadequate access to health care. . . .

[B]ecause pollutants may have cumulative and even synergistic effects that are not captured when risks are assessed one pollutant at a time, the current regulatory approach may badly underestimate overall pollution problems in minority communities.

In the area of program design, gushing enthusiasm for pollution trading has often overlooked the potential of trading programs to cause or exacerbate toxic "hot spots." Most of the older, larger, and dirtiest facilities—such as power plants, oil refineries, and chemical plants—are located in communities where people of color and poor people live. These facilities are more likely than newer facilities to buy credits to pollute in lieu of controlling their own pollution because of the high costs of retrofitting existing plants. The result is that a trading scheme can result in higher concentrations of dangerous pollution—"hot spots"—in poor areas and where persons of color live than in the rest of the area covered by the trading program. . . .

Enforcement is another area in which people of color and the poor fare worse than the general population. . . . Although empirical evidence in this area is scarce, several factors might contribute to enforcement disparities. The states are often the front-line enforcers of federal environmental law, yet they differ significantly in their ability and willingness to do this job. And some of the states with poor enforcement track records have large African-American, Latino, and/or low-income populations.

Because of the degree of discretion regulatory agencies have to prosecute violations or impose penalties, people of color and poor persons can do little in the face of lax enforcement by public officials. For these communities, even private citizen lawsuits are no panacea. Such litigation can be complicated and resource-intensive, making it difficult for financially strapped community

groups to underwrite the sophisticated monitoring, sampling, and analysis—let alone the sophisticated legal work—required to detect and challenge permit violations.

The cleanup of contaminated properties also raises several environmental justice issues. The divestment and blight that accompanies areas with more than their share of contaminated sites leaves people of color and poor persons who live nearby in a difficult situation. The first problem is that these areas have to compete with other contaminated sites for government cleanup resources. . . . [E]nvironmental justice advocates [claim] that sites in their communities are often neglected or receive less effective cleanups than sites in wealthier, predominantly white areas. . . . EPA-sponsored “brownfield” initiatives have offered some improvement by promoting community involvement in cleanup decisions. However, many contaminated sites are relegated to state brownfield programs because, although still dangerous, they are not contaminated enough to qualify for a federally sponsored cleanup. State brownfield programs vary widely in the degree of community involvement and cleanup. Moreover, because brownfield redevelopment projects often allow less stringent cleanup standards in light of anticipated industrial re-use, they have a tendency to lock in the legacy of industrial development in areas where people of color and poor persons live. Although there is typically a serious attempt to control the exposure to remaining hazardous wastes through physical means such as capping and through legal means such as deed restrictions, surrounding communities are left with the risk that these controls will fail. . . .

Finally, environmental justice advocates have consistently raised issues about environmental decision making and public participation. Environmental decision makers traditionally have heard the views of industry giants, conventional environmental organizations, state and local governments, and federal land managers, but not the people who actually live in the most affected areas. Gaining access to the fora where important environmental decisions are being resolved has been a large priority of environmental justice communities and organizations. Even where access is allowed, meaningful participation can be difficult; conventional stakeholders have significantly more time, money, and other resources to participate in these processes and influence agency policy and implementation. Environmental justice advocates often lack the resources to participate as effectively in such a highly technical arena, and this fundamentally tilted playing field significantly compounds the problems explained above, producing bad decisions that harm public health.

### *NOTES AND QUESTIONS*

1. **Subject Overview.** One impetus for the environmental justice movement comes from a variety of human health indicators that show significant differences among different sub populations. For example, EPA’s 2008 Report on the Environment reported an infant mortality rate—considered to be a particularly useful measure of health status because it indicates both current health status of the population and predicts the health of the next generation—to be 14.0 in 2003 for black infants and 6.8 for white infants. A number of other indicators reflect significant disparities, including rates of cancer, cardiovascular disease,

asthma, birth defects, and levels of mercury and lead in the blood, all of which have some linkage to environmental contaminants. See EPA, Report on the Environment (2008), chapter 5.

For a history and analysis of the environmental justice movement, its impact on law, and the legal tools available to pursue environmental justice claims, see Michael B. Gerrard & Sheila R. Foster eds., *The Law of Environmental Justice: Theories and Procedures to Address Disproportionate Risk* (2d ed. 2012).

**2. LULU Siting Patterns and Other Concerns.** Most specific environmental justice disputes so far have involved the locating of undesirable polluting facilities, often referred to as LULUs (for locally undesirable land uses). A number of studies have now documented that more LULUs are located in areas with significant minority populations than a random distribution of those facilities would explain. For instance, 56 percent of the population living within 3 kilometers of a hazardous waste site are people of color, whereas minority communities make up only 30 percent of the population outside of these areas. *Toxic Wastes and Race at Twenty 1987-2007, A Report Prepared for the United Church of Christ Justice & Witness Ministries.*

As the Center for Progressive Reform's Perspective indicates, the controversy concerning these undeniable statistics is what causes them. Some scholars doubt whether these patterns result from facility owners choosing to locate in areas with disproportionate minority populations.

Employing an original analysis of data from the St. Louis metropolitan area to separate out the possible causes of environmental disparities, this Article concludes that, to the degree that environmental disparities exist, it is economic factors—not siting discrimination—that are behind many claims of environmental racism. Industrial facilities that were originally sited in white areas often became surrounded by minority residents who are attracted to these neighborhoods by falling housing prices. . . .

Between 1970 and 1990, concentrations of poor and minority individuals increased disproportionately around the St. Louis area's CERCLA sites, TSDFs, and nonhazardous landfills and incinerators. . . . While the concentration of minority residents in a given census tract in the overall St. Louis area increased, on average, by 29%, concentration of minority residents in tracts containing industrial facilities increased by 67%. . . .

From 1970 to 1990, the average census tract in the St. Louis area experienced a 10% net increase in its poverty rate, compared to a 53% increase in tracts containing industrial and waste facilities. While St. Louis's mean family income rose 5.6%, in real terms, from 1970 to 1990, this figure actually fell 1.4% around industrial and waste sites. Relative increases in poverty rates and decreases in family incomes indicate that a higher percentage of low-income families were moving to (or remaining in) these areas from 1970 to 1990. [T. Lambert & C. Boerner, *Environmental Inequity: Economic Causes, Economic Solutions*, 14 *Yale J. on Reg.* 196, 197, 206-207 (1997).]

Professor Vicki Been has also questioned whether discriminatory purpose is the best single explanation for the pattern:

[M]y research team conducted a nationwide study of the demographics of the 544 communities that in 1994 hosted active commercial hazardous waste treatment storage and disposal facilities. . . .

[W]e found no substantial evidence that the facilities that began operating between 1970 and 1990 were sited in areas that were disproportionately African American. Nor did we find any evidence that these facilities were sited in areas with high concentrations of the poor; indeed, the evidence indicates that poverty is negatively correlated with sitings. We did find evidence that the facilities were sited in areas that were predominantly Hispanic at the time of the siting. The analysis produced little evidence that the siting of a facility was followed by substantial changes in a neighborhood's socioeconomic status or racial or ethnic composition. Finally, the analysis shows that the areas surrounding [hazardous waste facilities] currently are disproportionately populated by African Americans and Hispanics. [V. Been & F. Gupta, *Coming to the Barrios? A Longitudinal Analysis of Environmental Justice Claims*, 24 *Ecology L.Q.* 1, 9 (1997).]

Others have found that a better predictor of LULU location than either race or class is the degree to which a local community is politically organized.

Communities facing identical potential losses from the location of a noxious facility may nevertheless differ in the effective opposition they offer to the siting because of differences in their rates of political participation. The greater an area's potential for participation in collective action, the higher the firm's expected costs of litigation, lobbying, and compensation, and thus the less likely it will be to locate there. [Jay Hamilton, *Politics and Social Costs: Estimating the Impact of Collective Action on Hazardous Waste Facilities*, 24 *RAND J. Econ.* 101, 104-105 (1993).]

**3. Administrative Action.** At the federal level, responses to the environmental justice movement have been predominantly from the executive branch so far. President Clinton took a significant step in 1994, when he issued Executive Order 12,898, 59 *Fed. Reg.* 7,629 (1994), which directs each federal agency to

make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations.

EPA itself has been widely criticized for failure to implement Executive Order 12,898 as vigorously as it might. The Government Accountability Office concluded that EPA failed to take environmental justice considerations adequately into account when developing rules under the Clean Air Act. For instance, in developing a rule to reduce the sulfur content of gasoline, EPA analysis determined that pollution near oil refineries would be increased as a result of the rule, because the process of removing the sulfur generates some air emissions, while the amount of pollution being emitted by automobiles would be decreased. This raises potential environmental justice issues, because minority and low-income communities are disproportionately located near such facilities. Yet in responding to comments that raised this environmental justice concern, "specifically, EPA did not publish its estimate that potentially harmful emissions would increase in 26 of the 86 counties with refineries affected by the rule." GAO, *EPA Should Devote More Attention to Environmental Justice When Developing Clean Air Rules*, p. 4 (July 2005).

Executive Order 12,898 prompted all federal agencies to undertake a review of their internal decision-making procedures to incorporate

consideration of environmental justice issues into those procedures, pursuant to guidance published by EPA's Environmental Justice Office in 1995. The Nuclear Regulatory Commission was among the agencies who revised its procedures accordingly. (As an independent agency, the NRC is not directly covered by Executive Order 12,898, but it voluntarily promulgated an environmental justice strategy for internal decisions.)

A license application by Louisiana Energy Services (LES) to build a uranium enrichment plant in Homer, Louisiana, an almost entirely African-American town located in economically depressed northern Louisiana, provided a major test of the NRC's strategy. The draft environmental impact statement (EIS) for the application, issued prior to the executive order, did not include an analysis of environmental equity, but the final one, issued after the order, did. It described the neighborhoods surrounding the proposed facility, the site selection process, possible discrimination, and possible disproportionate impacts. The EIS concluded that there was no evidence of discrimination and no significant disproportionate impacts.

In May 1997, the NRC's Atomic Safety and Licensing Board (ASLB) rejected LES's permit application on environmental justice grounds. The Board found that NRC staff had failed to comply with the executive order by conducting only a cursory review of the site selection process. On appeal, the full NRC Board agreed that NRC staff had failed to delve sufficiently into disparate impacts that might be caused by the new facility, but it rejected the ASLB's additional instructions to the staff to inquire into whether racial discrimination influenced the process, ruling that the National Environmental Policy Act was not a tool for addressing racial discrimination. LES subsequently abandoned its plans and terminated the licensing process. The LES application is discussed further in Chapter 8.

A non-environmental statute, section 601 of Title VI of the Civil Rights Act of 1964, prohibits discrimination on the basis of race, color, or national origin under any program or activity receiving federal funding. Section 602 authorizes agencies to issue implementing regulations tailored to agencies' individual programs. Administrative complaints under these Title VI regulations have become a main avenue for environmental justice advocates to challenge agency decisions they claim impose disproportionate burdens on disadvantaged communities. Under these regulations, complainants do not have to prove a discriminatory intent, which would be their burden if they sued in court claiming a violation of section 601. The Supreme Court has ruled that section 602 authorizes regulations designed to avoid disparate impact alone. *Guardians Ass'n v. Civil Serv. Comm'n*, 463 U.S. 582 (1983).

EPA has issued such disparate impact regulations, and on February 5, 1998, it issued further Interim Guidance describing how it would investigate environmental justice complaints in order to "accommodate the increasing number of Title VI complaints that allege discrimination in the environmental permitting context." Industry, state, and local governments, and environmental groups have all criticized the Guidance as vague, but they disagree on the proper clarifications. The EPA's Interim Guidance, as well as draft documents subsequently issued in response to criticisms, can be found at <http://www.epa.gov/civilrights/extcom.htm>.

Title VI complaints based on environmental justice concerns are handled by EPA's Office of Civil Rights (OCR), which has been receiving complaints regarding siting of facilities, such as hazardous waste facilities, under programs administered by EPA. Under the cooperative federalism design of many of our environmental laws, qualifying states actually administer the day-to-day decisions of many of our federal statutes, and the Title VI complaint process extends to state decisions under those statutes. EPA has never granted a Title VI complaint, though a few Title VI proceedings have produced some collateral benefits. EPA's delays in processing these complaints and its refusal to grant any have subjected the agency to considerable criticism from environmental justice advocates. See Bradford C. Mank, "Title VI," in Michael B. Gerrard & Sheila R. Foster eds., *The Law of Environmental Justice: Theories and Procedures to Address Disproportionate Risks* 27-30 (2d ed. 2009).

4. **Litigation.** Private parties can seek declaratory or injunctive relief under section 601 of Title VI. *Cannon v. University of Chicago*, 441 U.S. 677 (1979). Success in such actions requires proof of discriminatory intent. In situations where such intent is absent or difficult to prove, environmental justice advocates have sought to establish a similar private right of action to enforce agency implementing regulations issued under section 602, which would only require proof of disparate impact. In a non-environmental case, the Supreme Court foreclosed that option by denying an implied right of action to enforce agency regulations issued to implement Title VI. *Alexander v. Sandoval*, 532 U.S. 275 (2001).

A dissent by Justice Stevens in *Sandoval* invited litigants to avoid the consequences of the denial of a private right of action under section 602's regulations by utilizing the protections of 42 U.S.C. §1983, which establishes liability against any "person, who, under color of [state law] . . . [deprives any citizen of the United States] of any rights, privileges, or immunities secured by the Constitution and laws of the [United States]." In the Title VI context, the section 1983 claim would be that agency implementing regulations prohibiting the administration of federal programs in ways that had a disparate impact create a right secured by a law of the United States. A New Jersey district court judge adopted this interpretation of section 1983, ruling that an earlier preliminary injunction to prevent a permit under the Clean Air Act, and based on an implied right of action under EPA's implementing regulations, would remain in effect after *Sandoval* under a section 1983 theory. *South Camden Citizens in Action v. New Jersey Dep't of Env'tl. Protection*, 145 F. Supp. 505 (D.N.J. 2001). On appeal, however, the Third Circuit reversed, holding that section 1983 is satisfied only by regulations that "merely further define[] or flesh[] out the content of [a right conferred on the plaintiff by the statute itself]." *South Camden Citizens in Action v. New Jersey Dep't of Env'tl. Protection*, 274 F.3d 771, 786-787 (3d Cir. 2001). Because section 601 covered only intentional discrimination and section 602 was not clear and unambiguous in establishing a federal right by itself, plaintiffs could not use the Title VI regulations as the basis for a section 1983 lawsuit. This setback did not end the South Camden litigation, however. Subsequently, the district court held that plaintiffs had alleged sufficient facts to state a claim for intentional discrimination directly under Title VI and the Fourteenth Amendment. 254 F. Supp. 2d 486 (D.N.J. 2003).

There is now a split in the circuit courts regarding the availability of section 1983 to raise environmental justice challenges under section 601, with the Fourth, Ninth, and Eleventh Circuits agreeing with the Third that there is not, and the District of Columbia and the Sixth Circuits concluding that there is. See *Save Our Valley v. Sound Transit*, 335 F.3d 932 (9th Cir. 2003) (collecting cases). Each of the circuits recognizing a cause of action, however, did so in cases decided prior to the Supreme Court opinion in *Gonzaga Univ. v. Doe*, 536 U.S. 273 (2002), which ruled that section 1983 protects federal rights, not laws, and which has been read to support the more restrictive interpretation of section 1983.

Despite the general lack of success in Title VI and section 1983 litigation, environmental justice claims do occasionally become the object of litigation when agencies incorporate EJ considerations into their normal administrative procedures, as instructed by the executive order. For example, environmental justice analysis has been held subject to judicial review under NEPA and the APA when an agency has included such analysis in its environmental impact statement. E.g., *Communities Against Runway Expansion, Inc. v. FAA*, 355 F.3d 678 (D.C. Cir. 2004).

**5. Environmental Justice and Democratic Decision Making.** In addition to being concerned with outcomes, environmental justice stresses the existence of procedural inequities inconsistent with the ideals of participatory democracy, whereby communities should be involved in decisions that affect their lives. Environmental justice advocates “demand[] the right to participate as equal partners at every level of decision making, including needs assessment, planning, implementation, enforcement and evaluation.” First National People of Color Environmental Leadership Summit, *Principles of Environmental Justice* (1991).

Along with problems that raise the other environmental values reviewed in this introduction, environmental justice issues will come up and be reviewed in more detail in subsequent chapters of this text that deal with siting controversies, the exposure of sensitive populations to toxic substances, regulatory priority-setting, enforcement, and environmental impact statements. The pathfinder below provides a guide to the rapidly expanding literature on environmental justice.

**6. Success Stories.** Although environmental policy development, execution, and enforcement still fall well short of what advocates of environmental justice seek, the issue of environmental justice now clearly occupies a central place in many environmental policy debates, as the earlier quotation from Carl Pope suggests. To one degree or another, environmental justice concerns undoubtedly influence a good number of government decisions being made today. In itself, that is a success story for environmental justice. Smaller successes can also be found. In 2004, for example, the state of North Carolina completed detoxification of the PCB landfill in Warren County that had become an early symbol of the lack of class- and race-related justice in environmental policy. “State and federal sources spent \$18 million to detoxify or neutralize contaminated soil stored at the Warren County PCB landfill. A private contractor hired by the state dug up and burned 81,500 tons of oil-laced soil in a kiln that reached more than 800 degrees Fahrenheit to remove the PCBs (polychlorinated biphenyls). The soil was put back in a football-size pit, re-covered to form a mound,

graded, and seeded with grass." Robert Bullard, *Environmental Racism PCB Landfill Finally Remedied But No Reparations for Residents*, see *World News and Press Releases* at <http://www.ejrc.cau.edu/>. Throughout the casebook, you will be confronted with policy controversies that have environmental justice dimensions.

### *ENVIRONMENTAL JUSTICE: A PATHFINDER*

Important resources on environmental justice include C. Rechtschaffen, E. Gauna & C. O'Neill, *Environmental Justice: Law, Policy and Regulation* (2d ed. 2009) and Michael B. Gerrard & Sheila R. Foster eds., *The Law of Environmental Justice: Theories and Procedures to Address Disproportionate Risks* 27-30 (2d ed. 2009), updated online at [http://www.americanbar.org/groups/environment\\_energy\\_resources/publications/books\\_related\\_products/ejupdates.html](http://www.americanbar.org/groups/environment_energy_resources/publications/books_related_products/ejupdates.html). Robert Bullard, one of the pioneers in studying the disparate impact of environmental risks, maintains an environmental justice resource center at Clark University, with a website at <http://www.ejrc.cau.edu/>, including extensive links to other web resources. R. Bullard, *Dumping in Dixie: Race, Class and Environmental Quality* (1990), and *Unequal Protection, Environmental Justice and Communities of Color* (1994) are classics in the field. His most recent book is *Highway Robbery: Transportation Racism and New Routes to Equity* (2004).

Environmental justice issues have been the subject of many law review articles, including: Foster, *Justice from the Ground Up: Distributive Inequalities, Grassroots Resistance, and the Transformative Politics of the Environmental Justice Movement*, 86 *Cal. L. Rev.* 775 (1998); Been, *Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?*, 103 *Yale L.J.* 1383 (1994); Lazarus, *Pursuing "Environmental Justice": The Distributional Effects of Environmental Protection*, 87 *Nw. U. L. Rev.* 101 (1993); Foster, *Race(ial) Matters: The Quest for Environmental Justice*, 20 *Ecology L.Q.* 721 (1993).

President Clinton's Executive Order 12,898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Communities*, appeared at 59 *Fed. Reg.* 7,629 (1994). Regulations issued by EPA to implement Title VI of the Civil Rights Act of 1964, 42 U.S.C. 1/22000d, can be found at 40 C.F.R. 1/27.35. EPA's Office of Civil Rights web page contains copies of key executive branch and EPA documents regarding implementation of the agency's Title VI compliance program, <http://www.epa.gov/civil-rights/>. Information on other aspects of EPA's environmental justice program, including reports by the National Environmental Justice Advisory Committee, can be found at <http://www.epa.gov/compliance/environmentaljustice/index.html>. EPA's Plan EJ 2014, providing a roadmap to help EPA integrate environmental justice into the agency's activities, is described at <http://www.epa.gov/compliance/environmentaljustice/plan-ej/index.html>. EPA now maintains a blog on "Environmental Justice in Action" at <http://blog.epa.gov/ej/>.

A memorandum of understanding signed by the heads of 17 federal agencies on August 4, 2011 now requires every agency to finalize and publicize its environmental justice strategy annually and to provide the public with annual implementation reports. It is available at <http://www.epa.gov/compliance/environmentaljustice/resources/publications/interagency/ej-mou-2011-08.pdf>.

### PROBLEM EXERCISE: MERCURY CONTAMINATION

For centuries, mercury, or quicksilver, has been known to be a nerve toxin. In the last several decades, scientists have gained greater awareness of how mercury enters the human body. Of particular concern, mercury emitted from smokestacks of coal-fired power plants and incinerators, or released by chlor-alkali plants, has been identified as a specific cause of mercury contamination. These mercury emissions eventually are deposited on land or water and then, either directly or through leaching of the soil, the mercury enters water bodies where it is consumed by living organisms. Mercury then bioaccumulates as larger organisms consume smaller ones, eventually becoming quite concentrated in a wide number of fish species.

EPA now recognizes fish consumption as the major source of human exposure to mercury. That exposure is considerable. A recent Centers for Disease Control study estimates that 6 percent of women of child-bearing age have blood levels of mercury higher than that considered safe by the EPA, with a consequence that around 630,000 children per year are born with elevated levels of mercury in their umbilical cord blood.

Based on a United States Department of Agriculture Continuing Survey of Food Intakes by Individuals conducted from 1994 through 1996, the EPA currently recommends that water quality standards for mercury be set based on the assumption that individuals consume 17.5 g of fish per day or two 8-oz. fish meals per month. This rate is far lower than what is actually consumed by many subsections of the population. In particular, "members of fishing tribes and indigenous peoples and members of other communities of color are among the highest consumers." Catherine A. O'Neill, *Mercury, Risk, and Justice*, 34 *Env'tl. L. Rep.* 11070, 11077 (2004). For instance, members of Ojibwe tribes of the Great Lakes were consuming fish at rates raging from 115.8 g/day to 240.7 g/day in the fall and 189.6 g/day to 393.8 g/day in the spring. *Id.* One reason that fishing tribes, indigenous peoples, and members of other communities of color consume far more fish than the national average, of course, is that many of these communities rely upon a fish catch as part of their subsistence living patterns. Others who are sensitive to mercury may eat the recommended amount and still be adversely affected. Body weight and age can affect the amount of fish a person is able to eat safely.

**Question One.** Does the problem of reducing mercury contamination from fish raise environmental justice concerns? How ought EPA respond to them? Should the water quality standards be set based on an assumption of much higher levels of consumption than EPA currently employs, even though the current standards, if met, would protect the vast majority of Americans and even though achieving more stringent water quality standards will be very costly?

One strategy that federal and state agencies have employed in their attempts to reduce fish consumption and the mercury contamination that can accompany it is to issue fish advisories that notify communities of the hazards of fish consumption and urge reductions in that consumption when tests reveal too much fish contamination in a watershed. While fish advisories can be given for a variety of reasons, in fact mercury accounts for 76 percent of all U.S. advisories, encompassing roughly 32 percent of the nation's lakes and 100 percent of Lakes Superior, Michigan, Huron, and Erie.

**Question Two.** Does the use of fish advisories as a strategy for lowering mercury contamination in human beings raise environmental justice concerns? How might those concerns be addressed?

In deliberating about strategies for reducing the man-made contribution to the mercury problem, the EPA has considered two different approaches. One would require each major source of mercury pollution to install maximum available control technology, thereby reducing each source's emissions by 90 percent or more. The other would employ a market system for mercury abatement, which would set a national cap on mercury emissions, assign an initial allocation of permissible mercury emissions to each source, and then let the sources trade permits to emit emissions with one another. Under such an approach, reductions would not be uniform, presumably, as one source might find it cheaper to purchase emissions permits from another source rather than abate. (See Chapter 5, pages 624-625, for a discussion of how such a system works.)

**Question Three.** Does the choice between these two approaches raise environmental justice concerns? The effect of a market approach on a particular source or sources emissions is difficult to predict because it depends upon decisions made by firms after the market system is implemented. Nonetheless, one study has projected the impact of EPA's market alternative compared to the maximum available control technology approach. It predicts that "every source in the upper Great Lakes states of Michigan, Minnesota and Wisconsin but one" will emit more mercury under the market approach than under the technology approach, and that several sources there will actually emit more under the market approach than they do now. O'Neill, at 11100. Does this information affect your answer? How would you decide which approach to use?

(Mercury is also the subject of a Case Study in Chapter 3—pages 245-251. See that Case Study for more information on mercury as well as for further citations documenting the contents of this one.)

**Question Four.** In 1999, U.S. coal-fired power plants emitted approximately 120 tons of mercury into the air, while coal-fired power plants in China emitted 600 tons of mercury. Because of long-distance, atmospheric transport of these pollutants, it is estimated that 30 percent or more of the mercury found in the United States originates in China. Matt Pottinger, Steve Stecklow & John J. Fialka, *Invisible Export—A Hidden Cost of China's Growth: Mercury Migration*, Wall St. J., Dec. 20, 2004, at A1. By the year 2020, China is expected to double its electric power production, primarily by constructing new coal-fired power plants. Unless China acts to reduce mercury emissions from these new power plants, increases in mercury emissions from China that reach the United States will vastly offset any reductions from U.S. sources. What effect, if any, should mercury emissions from China have on U.S. mercury control policy?

If China refuses to act to control these emissions, is it futile for the United States to try to reduce emissions from its own power plants? In February 2009, more than 140 nations, including the United States, China, and India, agreed to begin negotiations on a treaty to establish binding limits on mercury emissions. The negotiations, conducted under the auspices of the United Nations Environment Programme, resulted in an agreement in January 2013 on the first legally binding treaty to control mercury pollution, known as the Minamata Convention on Mercury.

### C. ECONOMICS AND THE ENVIRONMENT

Each of the value systems we have briefly canvassed has associated with it a distinctive discourse and set of concepts within which its problems are formulated and debated. In recent years, economics has become increasingly the lingua franca in government policy discussions about the environment. The late William Baxter, writing in the language of economics, argued that “to assert that there is a pollution problem or an environmental problem is to assert, at least implicitly, that one or more resources is not being used so as to maximize human satisfactions. Environmental problems are economic problems, and better insight can be gained by the application of economic analysis.” W. Baxter, *People or Penguins: The Case for Optimal Pollution* 17 (1974).

Users of other value systems relevant to environmental policy disagree with this statement. They object to the value premises implicit in the economic approach, they reformulate environmental problems in their own discourses, and they engage in technical criticisms of economic methods to show that those methods are incomplete, misleading, or inaccurate. Because economic concepts and terminology are so prevalent in this field, it is vital that everyone approaching environmental law be conversant with those concepts and terminology—if only so that criticism of them can be informed and astute.

The readings in this section serve to introduce the economic approach to environmental problems.

#### 1. *The Role of Prices and Markets*

|| *Eban S. Goodstein, Economics  
and the Environment* ||  
33-39 (1995)

From an economist's point of view, market systems generate pollution because many natural inputs into the production of goods and services such as air and water are “underpriced.” Because no one owns these resources, in the absence of government regulation or legal protection for pollution victims, businesses will use them up freely, neglecting the external costs imposed on

others. For example, suppose the Stinky Paper Co. discharges polluted water into a stream, which kills the fish that downstream people enjoy eating. If Stinky were forced to compensate these people for the damages it imposed (**internalize the externality**), the firm would in effect be paying for the water it used up. Water would no longer be “underpriced.” As a result, Stinky would conserve its use of water and would seek out ways to clean up its discharge. This, in turn, would raise the production costs of the firm. . . .

Because the river water is commonly owned and thus a “free” good, Stinky overexploits it and the fisherfolk downstream are exposed to a negative externality of the paper production process. From an economic point of view, many pollution problems arise because by their nature environmental resources such as water and air are commonly owned. . . .

Because all resources in an economy cannot be privately owned, market systems will generate too much pollution by either of the standards considered in this book—efficiency or safety. There are two related reasons for this. The first is the **free-access problem** which can arise when property is commonly held. The free-access problem can be stated simply: If people weigh private benefits against private (as opposed to social) costs, they will overexploit common resources when given free access. This idea was popularized in the late 1960s by a social ecologist named Garrett Hardin, who called it “The Tragedy of the Commons.” [See pages 50-51.] . . .

The free-access problem may explain why there is a tendency for commonly held resources such as clean air and water or fisheries to be overexploited. But why does the government have to decide what to do about it? Instead, why don't the victims of negative externalities simply band together on their own to prevent pollution? As we noted earlier, this was the response to environmental degradation of common grazing and fishing grounds in traditional societies. Informal social pressure and tradition were relied on to prevent overexploitation. The modern American equivalent would be to sue an offending company or individual for damages. Indeed, a few so-called **free-market environmentalists** have advocated eliminating many environmental regulations, then relying on lawsuits by injured parties to “internalize” externalities.

Such private remedies to environmental degradation run into what economists call the **public goods problem**. Public goods are goods which are enjoyed in common. The provision of public goods is a problem for the free market due to the existence of two factors: free-riding and transactions costs. To illustrate, consider a good that is enjoyed in common such as, for example, the noise level after 11 o'clock at night in Axl's neighborhood. Now suppose that neighbor Tipper cranks her sound system. Axl could go to the considerable trouble of obtaining signatures from all of his neighbors, getting money from them to hire a lawyer, file a lawsuit, and possibly obtain a legal injunction requiring her to turn the music down. The costs of undertaking this action are known as **transaction costs**, and they are particularly high because of the public nature of the injury.

If Axl does undertake the effort, he will benefit not only himself but also the entire neighborhood. Some of the neighbors might refuse to help out and instead **free-ride** on Axl's provision of the public good. Instead, Axl decides it's not really worth organizing a lawsuit and tosses and turns in bed, hoping that someone else will make the effort. The result is that although there may be

considerable total demand for a quiet evening in the neighborhood, it doesn't get expressed. It is not worth it to any one individual to overcome the transaction costs and the possibility of free-riding required to provide the public good of the lawsuit though, if he did, the social benefits might far outweigh the cost.

In most towns, the response to noise pollution is a government regulation called a nuisance law. With such a regulation in place, Axl can just call the police, greatly reducing the costs associated with stopping the noise. The general principle is that without government intervention, public goods—in this case, a quiet evening—will be undersupplied. . . .

To summarize . . . , in contrast to private goods, public goods are goods which are consumed in common. The true demand for public goods will not be satisfied in pure market economies due to high transaction costs and free-riding. Free-market environmentalists who advocate relying solely on the court system to internalize environmental externalities recognize these twin hurdles. But they believe these obstacles are not really that large, especially considering the costs associated with regulation. Most economists, however, argue that as a result of transaction costs and free-riding, public goods such as clean air or water, rain forests, wilderness parks, and other environmental amenities will be undersupplied in a laissez-faire market system.

### NOTES AND QUESTIONS

**1. Polluter Pays Principle.** Markets limit resource use to activities valued in the market more highly than its value when used in other ways. If the resource, e.g., clean air, is not sold in a market, it will be used for waste disposal (pollution) even if clean air is valued more. Having the polluter pay for the externalities or damages caused by its pollution ensures that the costs of production reflect the costs of environmental damage. If this "polluter pays" principle were carried through to all factors of production, the result would be an efficient allocation of resources. The difficulties of internalizing externalities by implementing the "polluter pays" principle are well explored in F. Anderson et al., *Environmental Improvement Through Economic Incentives* (1982).

**2. Beneficiary Pays Principle.** Some situations do not lend themselves to implementation of the polluter pays principle. Especially significant, international environment problems, such as global warming, do not, because international agreements operate under a rule of voluntary assent by nation-states. If treaties sought to impose net costs on a country because that country imposed more pollution costs on other countries than they imposed on it, the country "will simply decline to participate. . . . Under the rules of international law, where each country must give consent, regulatory instruments must instead follow a 'Beneficiary Pays Principle.' The beneficiaries of global environmental protection must attract non-beneficiary sources to participate, because the former cannot compel the latter to comply." Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 *Yale L.J.* 677, 752 (1999).

**3. The Coase Theorem.** In an important article, Ronald Coase argued that polluter pays and beneficiary pays would, if bargaining were costless, each lead to efficient allocation of resources. Under either approach, the pollution will be

abated only if controlling it is cheaper than the damage it causes its victims. For example, if the peace of mind of the residents who live near a nuclear reactor currently shut down for repairs was worth more than the value of operating the plant, then the plant would not be restarted either because the residents could gain by paying the plant not to operate (under beneficiary pays) or because it would not be economical for the plant to compensate residents for their fears (under polluter pays). In principle, either solution will result in solving the environmental problem, economically viewed, because it will eliminate the undesirable externality aspects of the situation. See Coase, *The Problem of Social Cost*, 3 *J.L. & Econ.* 1 (1960).

Coase's views have been particularly influential in the privatization movement, because one application of Coase's argument is to urge that sometimes pollution problems can be left to private market solutions, where polluter and pollutee can bargain for the appropriate level of polluting activity relatively free from governmental interference. See, e.g., T.L. Anderson & D.R. Leal, *Free Market Environmentalism* (rev. ed. 2001). One of the earliest, and still among the most valuable, essays on the advantages of markets for pollution rights is H. Dales, *Pollution, Property and Prices* (1968).

**4. Are the Two Really Equivalent?** Whether polluter pays or beneficiary pays can be viewed as a question of who has been assigned an initial entitlement. If the polluter can continue polluting until she is paid to stop, she has a right to pollute; if the polluter must pay the beneficiaries (who you might think of as victims, were the pollution not stopped), they have a right to be free of pollution. In addition to noting the obvious unreality of the zero-transaction-cost assumption, critics of Coase's Theorem are quick to point out that the initial allocation of such rights can have a significant impact on the distribution of income. The distribution of income in turn affects tastes and alters the ultimate outcomes produced by market economies. In addition, one's thinking about the initial allocation may be affected by ethical or moral considerations.

While extolling the importance of efficiency, economists have tried to dismiss distributional concerns by arguing that they should be dealt with by general tax and welfare policies or by assuming that winners and losers are approximately the same when more efficient policies are pursued. Noting that Coase himself emphasized that all market transactions have costs (Coase argued that the very existence of firms illustrated that nonmarket mechanisms can be cheaper in some circumstances than market ones), Judge Guido Calabresi maintains that "distributional issues cannot, even in theory, be avoided." Calabresi, *The Pointlessness of Pareto: Carrying Coase Further*, 100 *Yale L.J.* 1211, 1215 (1991). Calabresi argues that transaction costs, "no less than existing technology, define the limits of what is currently achievable in society," *id.* at 1212, and that "there is no difference, in theory or in practice, between the reduction or elimination of these impediments and any other innovation in knowledge or organization which might make us all better off." *Id.* at 1218. Thus, he maintains that the real challenge for social policy is to decide which impediments to invest in removing, which inevitably requires explicit consideration of distributional concerns.

**5. Economic Efficiency as a Policy Objective.** The economic approach to environmental problems treats the environment as a resource that is underpriced. Were it priced properly, markets would ensure it was used by whoever valued it most, as measured by persons' willingness to pay for it. Ideally, markets produce efficient outcomes—resources move to the users who value them most highly, and no voluntary exchange among potential users is left unexecuted. Many of the value systems introduced earlier in this chapter challenge whether this is the appropriate way to approach environmental issues. Some have questioned whether efficiency in the sense just described has any justification as a public policy objective.

If the efficiency criterion had a normative basis in the ethical theory of utilitarianism, it would have a demonstrable connection with happiness or a related normative conception of the good, and it would judge the value of actions and decisions according to their consequences. The efficiency criterion and the theory of welfare economics from which it is developed possess neither of these attributes, however, and they therefore have no justification in the ethical theory of utilitarianism.

Sophisticated economic analysts do not try to connect the efficiency norm with the classical [utilitarian goal] of maximizing pleasure or happiness. . . . As Richard Posner correctly points out, "The most important thing to bear in mind about the concept of value in the welfare economist's sense is that it is based on what people are willing to pay for something rather than the happiness they would derive from it."

Some policy analysts, however, believe that the satisfaction of consumer and other personal preferences has a moral foundation as a policy goal because it leads to or produces satisfaction in the sense of pleasure or happiness. This belief rests on nothing more than a pun on the word "satisfaction." Preferences are *satisfied* in the sense of "met" or "fulfilled"; this is also the sense in which conditions and equations are satisfied. "Satisfaction" of this sort has no necessary connection with "satisfaction" in the sense of pleasure or happiness.

The evidence indicates, in fact, that the satisfaction of preferences does not promote or cause satisfaction in the sense of happiness. Empirical research confirms what ordinary wisdom suggests: happiness depends more on the quality and pursuit of preferences than on the degree to which they are satisfied.

It is useful to recognize, moreover, that the contemporary "utilitarianism" represented by current welfare economic theory is not concerned with what happens to people as a result of their choices. Instead, it is concerned with the beliefs and expectations revealed in those choices. The focus is on the amount people are willing to pay for things rather than on the consequences of those decisions, except insofar as those consequences are defined tautologically in terms of willingness to pay. [M. Sagoff, *The Principles of Federal Pollution Control Law*, 71 *Minn. L. Rev.* 19, 55-57 (1986).]

Is the economic approach to environmental issues a sound one? How would you defend it or criticize it?

## 2. *Cost-Benefit Analysis*

When markets for environmental resources do not exist, welfare economics suggests that government can sometimes legitimately intervene. In order to test whether any proposed governmental policy actually improves overall welfare, welfare economics recommends that such policy be subjected to a

cost-benefit analysis (CBA), which seeks to compare the "social benefit" of the policy to its "opportunity cost—the social value foregone when the resources in question are moved away from alternative economic activities into the specific project" contemplated by the policy. E.J. Mishan, *Cost-Benefit Analysis* xii (1976).

Cost-benefit and risk-benefit analyses have become a standard part of environmental policy discussions. They are at the heart of the controversy surrounding EPA's decisions to ban certain products that contain asbestos, for example. See *Corrosion Proof Fittings*, page 264. EPA's significant decision to phase down the amount of lead in gasoline (see page 196) also relied in part on a cost-benefit analysis. In 1984, EPA prepared a preliminary CBA, ultimately focusing on two options: a "low-lead" option, in which gasoline with a low-lead content (.10 grams per gallon) would continue to be marketed to ease fears that older cars would suffer valve damage from unleaded gasoline; and a "no-lead" option, which would ban all lead additives in gasoline by 1988. The results of its calculations of costs and benefits are shown in Figure 1.2.

A major source of costs in the lead phasedown CBA, as in a great many CBAs of proposed environmental regulations, comes from the capital and operating costs associated with installing and running new plant equipment. In a few cases, the estimates of costs used in the CBA have been compared with actual costs once the regulation has been implemented. Some costs and benefits can be harder to estimate in dollars than others. In Figure 1.2, notice the benefit items labeled "Reduced medical care costs," and "Reduced cognitive damage." In calculating the latter, EPA referred to studies showing that elevated concentrations of lead in blood have an effect on cognitive abilities. Reducing these cognitive deficits by lowering blood lead levels was valued by estimating the costs of

**FIGURE 1.2**  
Costs and Benefits of Reducing Lead in Gasoline (figures in 1983 dollars)

	<i>Low-lead</i>	<i>No-lead</i>
<i>COSTS</i>		
Manufacturing costs	\$503 million	\$691 million
Nonmonetized valve damage to engines	\$0	D
<b>TOTAL COSTS</b>	<b>\$503 million</b>	<b>\$691 million + D</b>
<i>BENEFITS</i>		
Maintenance benefits	\$660 million	\$755 million
Environmental and health benefits		
<u>Conventional Pollutants</u>		
Reduced damage by eliminating misfueling	\$404 million	\$404 million
Nonmonetized health benefits	H1	H1
<u>Lead</u>		
Reduced medical care costs	\$41 million	\$43 million
Reduced cognitive damage	\$184 million	\$193 million
Nonmonetized health benefits	H2	H3
<b>TOTAL BENEFITS</b>	<b>\$1.289 billion + H1 + H2</b>	<b>\$1.395 billion + H1 + H3</b>
<b>NET BENEFITS</b>	<b>\$786 million + H1 + H2</b>	<b>\$704 million + H1 + H3 - D</b>

Source: EPA, *Costs and Benefits of Reducing Lead in Gasoline* (Mar. 1984).

remedial education that would otherwise be necessary to remediate the deficits—an amount that came out to \$4,000 per child benefited, using Department of Education estimates. Subsequent estimates by EPA were as high as \$8,300. It has been fairly standard practice to estimate benefits according to an estimate of what people would be willing to pay for the benefit, “because the amount people are willing to pay for a good or service is the best measure of its value to them.” Executive Office of the President, Regulatory Program of the United States xix (1987).

Using a willingness-to-pay approach, an economist, Randall Lutter, attempted to estimate how much parents are willing to spend to treat their children when warned that their blood lead levels are too high. He used chelation therapy, which is effective for high levels of exposure, but less so for low levels. Most of the costs of such therapy in his calculations were the value of the mother’s time in taking her child to and from the treatment location. Lutter’s estimate is that an IQ point is worth \$1,100. Randall Lutter, *Valuing Children’s Health: A Reassessment of Benefits of Lower Lead Levels*, AEI-Brookings Joint Center for Regulatory Studies, Working Paper 00-02 (2000). The various techniques for determining what people would be willing to pay for goods that are not traded in regular markets (or “shadow prices”) are discussed in I. Pearce & R. Turner, *Economics of Natural Resources and the Environment* 141-158 (1990).

### NOTES AND QUESTIONS

1. Special controversies surround the willingness-to-pay principle when it is applied to benefits that save lives. What objections might be made to the exercise of “placing a value on human life” in a cost-benefit assessment? See W.K. Viscusi, *Strategic and Ethical Issues in the Valuation of Life*, in *Strategy and Choice* (R. Zeckhauser ed., 1991). However controversial the idea might be, the Administrative Conference of the United States has recommended that, except where costs and benefits are “highly conjectural” or unquantifiable, agencies should “disclose the dollar value per statistical life” used to reach determinations that the costs of regulations are cost-benefit justified. ACUS, *Valuation of Human Life in Regulatory Decision-Making*, 1 C.F.R. 1/2305, 88-7. Using some of the shadow price methodologies, economists have estimated people’s willingness to pay to save a human life at anywhere from \$200,000 to \$7 million, in 1990 dollars.

2. Even when reliable market prices exist and are readily available for EPA’s use, some estimates will remain uncertain. A large item of benefits in EPA’s CBA for lead came from reduced maintenance cost to exhaust systems (whose life would be prolonged by low-lead or no-lead gasoline), to spark plugs (same reason), and from longer periods between oil changes. For the low-lead case, these savings were estimated at \$341 million, \$80 million, and \$239 million, respectively. Why might these amounts be uncertain?

3. Although monetizing all costs and benefits can be difficult, and the estimates uncertain, it can be an important exercise. If some of the costs and benefits are simply presented in a descriptive fashion, the elements of the analysis “tend to be ‘less concrete,’ and more ‘soft’ than market-place benefits [or costs], [and] [t]he temptation is to downgrade them by comparison.”

Pearce & Turner at 123. Why were some of the health benefits for the lead phasedown represented as “nonmonetized”?

4. When EPA adopted the lead phasedown regulation in 1985, it prepared a final cost-benefit analysis. Figure 1.3 summarizes EPA’s final estimates. Note the enormous benefits from reducing adult blood pressure, a health benefit not monetized in EPA’s proposal because it had only recently been discovered through epidemiological data. Because of uncertainty concerning the blood pressure studies, the final cost-benefit analysis also calculated net benefits excluding blood pressure benefits.

5. Data from the Third National Health and Nutrition Examination Survey released in 1994 found that, due largely to EPA’s phasedown of lead additives in gasoline, average levels of lead in children’s blood had declined sharply from 12.8 micrograms ( $\mu\text{g}$ ) per deciliter during the 1976-1980 survey period to 2.8  $\mu\text{g}$  during the 1988-1991 survey. Brody et al., *Blood Lead Levels in the U.S. Population*, 272 *JAMA* 277, 281 (1994). See Figure 1.4. A study by an EPA economist now estimates that each 1 microgram reduction in average blood lead concentrations yields monetized net benefits of \$17.2 billion per year. Schwartz, *Societal Benefits of Reducing Lead Exposure*, 66 *Envtl. Health* 105, 119 (1994). What do these figures suggest about the accuracy of EPA’s initial CBA?

6. Two scholars have written that:

The basic problem with narrow economic analysis of health and environmental protection is that human life, health, and nature cannot be meaningfully described in monetary terms; they are priceless. When the question is whether to allow one person to hurt another, or to destroy a natural resource . . . when harms stretch out over decades or even generations . . . — then we are in the realm of the priceless, where market values tell us little about the social values at stake.

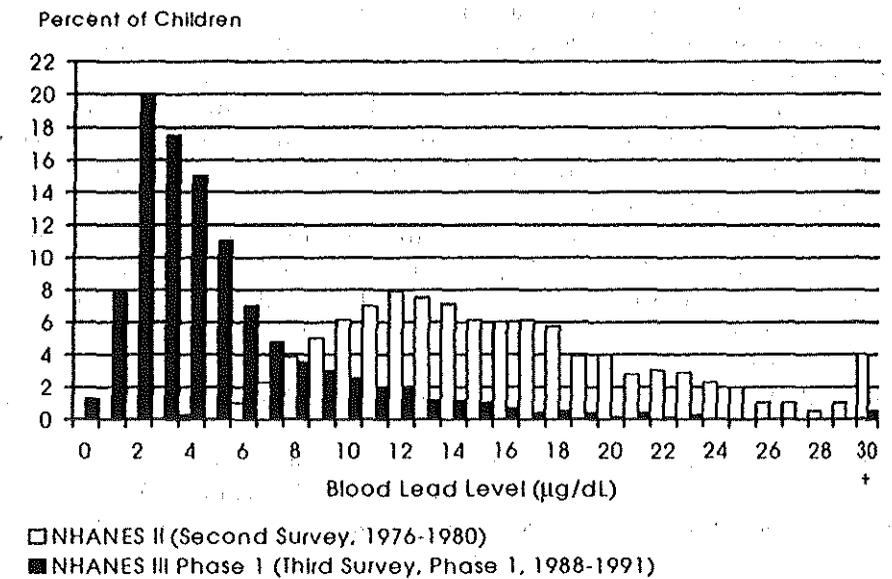
There are hard questions to be answered about protection of human health and the environment, and there are many useful insights about these questions from the field of economics. But there is no reason to think that the

**FIGURE 1.3**  
Costs and Monetized Benefits of Lead Regulation, Assuming Partial  
Misfueling, 1986 (millions of 1984 dollars)

Benefit Category	\$
Children’s health care effects	623
Adult blood pressure	6,124
Conventional pollutants	231
Maintenance	949
Fuel economy	194
Total monetized benefits	8,121
Total refining costs	631
Net benefits	7,490
Net benefits excluding blood pressure	1,366

Source: Office of Policy Analysis, Environmental Protection Agency, *Costs and Benefits of Reducing Lead in Gasoline*, Report no. EPA-230-05-85-006 (Feb. 1985), p. E-12. Reprinted from: P. Portney, *Air Pollution Policy*, in *Public Policies for Environmental Protection 64* (P. Portney ed., 1990).

FIGURE 1.4  
Blood Lead Levels for Children Aged One to Five Years



Source: National Health and Nutrition Examination Surveys (NHANES).

right answers will emerge from the strange process of assigning dollar values to human life, human health, and nature itself, and then crunching the numbers. [Frank Ackerman & Lisa Heinzerling, *Priceless: On Knowing the Price of Everything and the Value of Nothing* 8 (2004).]

Cost-benefit analysis has become a staple of environmental policy analysis. As you encounter it in various settings throughout the book, consider whether it is an appropriate basis for deciding what to do—because it supplies the “right answer”—or whether the elements that make it up—rigorous efforts to estimate the costs of correcting some harmful environmental stressor and to identify the magnitude of the health or environmental benefits to be gained—are better considered “useful insights” for a decision that cannot in the final analysis be made solely on economic grounds.

### 3. Valuing Ecosystem Services

In recent years, ecologists have been attempting to place monetary values on the services that entire ecosystems perform for the benefit of humankind. One of their premises is that hard-to-quantify values of such services, as well as benefits that emerge from the interaction and interdependency of ecosystems, may be lost when project-specific cost-benefit analyses are being performed. See, e.g., Gretchen Daily ed., *Nature's Services: Societal Dependence on Natural Ecosystems* (1997). One controversial attempt to place a global value on everything that the world's ecosystems do for humans came up with a central estimate of \$33 trillion per year. Costanza et al., *The Value of the World's Ecosystem*

Services and Natural Capital, 387 *Nature* 253 (May 1997). That figure compares to an estimate of total world gross national product of \$18 trillion per year.

This "value of everything" project has attracted a great deal of criticism, in part because it is meaningless to develop a global estimate of all ecosystem services when the relevant questions almost always relate to more specifically defined ecosystems and more narrowly defined capital projects that might compete with leaving ecosystems in place. A greater appreciation of the value of ecosystems services has been working its way into the smaller, but considerably more realistic, analyses as well, as the following excerpt describes.

	*James Salzman, Creating Markets for*	
	*Ecosystem Services*	
	80 N.Y.U. L. Rev. 870 (2005)	

Largely taken for granted, healthy ecosystems provide a variety of such critical services. Created by the interactions of living organisms with their environment, these "ecosystem services" provide both the conditions and processes that sustain human life—purifying air and water, detoxifying and decomposing waste, renewing soil fertility, regulating climate, mitigating droughts and floods, controlling pests, and pollinating plants. Although awareness of ecosystem services is certainly not new, efforts to identify and calculate these services' valuable contributions to social welfare are. Recent research by ecologists and economists has demonstrated the extremely high costs of replacing many of these services if they were to fail, on the order of many billions of dollars in the United States for pollination alone. Such estimates are inherently uncertain, of course, but the extraordinary costs required to substitute for many important services by artificial means are beyond dispute.

One cannot begin to understand flood control, for example, without realizing the impact that widespread wetland destruction has had on the ecosystem service of water retention; nor can one understand water quality without recognizing how development in forested watersheds has degraded the service of water purification. The costs from degradation of these services are high, and suffered in rich and poor countries alike. One might therefore expect that ecosystem services would be prized by markets and explicitly protected by the law. Despite their economic value and central role in provision of important public benefits, however, ecosystem services are only rarely considered in cost-benefit analyses, preparation of environmental impact assessments, or wetlands mitigation. Nor, in the past, have significant markets arisen that capitalize on the commercial value of these services. This is starting to change, however. From their origins as an obscure phrase just nine years ago, "ecosystem services" have gone mainstream, with new initiatives and markets for provision of services blossoming around the world. The United States Environmental Protection Agency (EPA), for example, has created a Science Advisory Board on Valuing the Protection of Ecological Systems and Services. In Australia, a high-level advisory body, known as the Wentworth Group, has called for a new approach to environmental protection that focuses on provision of ecosystem services. In Costa Rica, the government is administering a nationwide scheme of payments for services. The international climate change negotiations are closely focusing

on policy instruments that encourage carbon sequestration. And this is just the tip of the iceberg. A recent study documented 287 cases of payments for forest ecosystem services from around the world and an international marketplace website for services has just been launched (available at <http://www.ecosystemmarketplace.com>). . . .

The first insight of an ecosystem services perspective is that investing in natural capital can prove more efficient than using built capital to deliver key services. . . . A well-known example in the water quality field makes the point in a concrete setting. In the early 1990s, a combination of federal regulation and cost realities drove New York City to reconsider its water supply strategy. New York City's water system provides about 1.5 billion tons of drinking water to almost nine million New Yorkers every day. Ninety percent of the water is drawn from the Catskill/Delaware watershed, which extends 125 miles north and west of the city. Under amendments to the federal Safe Drinking Water Act, municipal and other water suppliers were required to filter their surface water supplies unless they could demonstrate that they had taken other steps, including watershed protection measures, to protect their customers from harmful water contamination.

Presented with a choice between provision of clean water through building a filtration plant or managing the watershed, New York City easily concluded that the latter was more cost effective. It was estimated that a filtration plant would cost between \$6 billion and \$8 billion to build. By contrast, watershed protection efforts, which would include not only the acquisition of critical watershed lands but also a variety of other programs designed to reduce contamination sources in the watershed, would cost only about \$1.5 billion. Acting on behalf of the beneficiaries of the Catskills' water purification services, New York City chose to invest in natural rather than built capital. Nor is New York City alone. As of 1996, the EPA had indicated that over 140 municipalities qualified to use watershed conservation as a means of ensuring high drinking water quality. . . .

If ecosystem services clearly provide valuable services, then why don't more payment schemes exist? Why are markets so hard to set up? The answer is threefold—ignorance, institutional inadequacy, and the problems inherent in public goods.

Perhaps the most basic reason we do not pay more attention to the provision of ecosystem services is that we take them for granted. . . . This lack of knowledge is due both to the lack of relevant data and to the multivariate complexity of the task. Analysis of how ecosystems provide services has proceeded slowly not only because ecosystem level experiments are difficult and lengthy, but also because research to date has focused much more on understanding ecosystem processes than determining ecosystem services. And how an ecosystem works is not the same as the services it provides. . . .

[It] is [also] fair to say that our laws were not designed with ecosystem services in mind. Legal protection of ecosystems was not a primary objective when the relevant laws were drafted over two decades ago. Generally speaking, our pollution laws (e.g., the Clean Air Act and Clean Water Act) rely on human health-based standards. Our conservation laws (e.g., the Endangered Species Act and Marine Mammal Protection Act) are species-specific. And planning under our resource management laws (e.g., the National Forest Management

Act and Federal Land Policy and Management Act) must accommodate multiple and conflicting uses. Of course, parts of these laws, such as the Clean Water Act's Section 404 wetlands permit program and use of water quality standards, the Endangered Species Act's critical habitat provisions, and the National Forest Management Act's use of indicator species such as the spotted owl, clearly can help to conserve ecosystem services. The point, though, is that these laws were not primarily intended to provide legal standards for conservation of natural capital and the services that flow from it and, as many authors have pointed out, in practice they usually don't. . . .

The last reason there are so few markets, and perhaps the most important, concerns the role of markets and public goods. . . . We have no shortage of markets for most ecosystem goods (such as clean water and apples), but the ecosystem services underpinning these goods (such as water purification and pollination) are free. The services themselves have no market value for the simple reason that no markets exist in which they can be bought or sold. As a result, there are no direct price mechanisms to signal the scarcity or degradation of these public goods until they fail (at which point their hidden value becomes obvious because of the costs to restore or replace them). This might not be critically important if most lands providing services were public property that could be set aside for conservation, but they are not. Private lands are vital not only for biodiversity conservation, but also for provision of most other services. . . .

Such circumstances make ecosystem services easy to take for granted. Because it is difficult to prevent someone who did not pay for an ecosystem service from benefiting from it, it is equally difficult to get such people to pay for provision of these services. Why pay for something when you have always gotten it for free? As a result, a key challenge in implementing an ecosystem services approach lies in creating a market where none exists—in capturing the value of the service by compensating the providers. This approach, notably unlike that of traditional regulatory or tax instruments, views environmental protection much as a business transaction between willing parties.

### NOTES AND QUESTIONS

1. The "value of everything" project derived its total value for ecosystem services by using data from studies of discrete resource allocation issues such as those discussed in the Salzman excerpt and then extrapolating to a world scale. Economists have criticized this extrapolation as "a serious error." "Values estimated at one scale cannot be expanded by a convenient [multiplier] to another scale, nor can two separate value estimates simply be added together. When we estimate a compensation measure of one element of an ecosystem, we assume that other aspects of the constraints influencing human well-being are unchanged. For example, we might compute a compensation measure for the elimination of a specific wetland. In another analysis, a compensation measure for the elimination of a different wetland might have been estimated, holding the first at its initial level. But the two compensation measures are *not* additive. . . ." Bockstael et al., *On Valuing Nature*, 34 *Env't Sci. & Tech.* 1384 (2000).

2. There has been considerable interest in incorporating the value of ecosystem services into an increasing variety of environmental programs, from wetlands loss mitigation programs to emissions trading programs and beyond. See, e.g., J.B. Ruhl, S. Kraft & C.L. Lant, *The Law and Policy of Ecosystem Services* (2007). Using incentive- or market-based plans to maintain or preserve ecosystem services also has become a hot topic in natural resource management circles. For instance, an environmentally conscious entrepreneur, John Forgach, has proposed selling 25-year bonds to provide the financing for a major effort by Panama to reforest the watershed around the canal, thus providing a more regular flow of fresh water into the canal to prevent the seasonal drying up of the water supply that is slowing the flow of cargo ships through the canal. He anticipates that big shipping clients, such as Wal-Mart or Asian car makers, who rely upon the Canal, and who currently insure against the huge losses they could suffer if the Canal were closed, would pay a reduced premium if they invested in the forest bonds. *Are You Being Served?*, *The Economist* pp. 76-78 (April 23, 2005). Ecosystem services cannot be marketed, however, until the functional linkages between different elements of the environment and valuable services are well enough understood so that realistic values can be assigned to them with sufficient reliability to give investors confidence that they are getting their money's worth. New York's decision to preserve rural lands in the Catskills is evidence that this is sometimes possible, but much more will need to be learned about other ecologies in order to achieve the amount of reliability necessary. The ecosystem services idea is stimulating significant progress in ecological studies to fill these gaps. See the National Resources Council, *Valuing Ecosystem Services 2* (2004).

#### D. ECOLOGICAL PERSPECTIVES

The science of ecology seeks to understand the functioning of ecosystems, both on a small scale (such as the ecosystem of a small freshwater wetland) and on a grand scale (such as the global oxygen-carbon dioxide-water cycle, which plays a vital role in world climate and climate changes). Through studying ecosystems, ecologists seek knowledge about the entire process of life by synthesizing chemical, geological, and meteorological information about the environment and biological and chemical information about living organisms and combining them into a single system.

This drive to comprehensiveness derives from the overarching idea of interdependence, which is further reflected in such ecological slogans as "you can never do just one thing" and "everything is connected to everything else." This idea lies close to the heart of many bio-centered or eco-centered philosophies. Aldo Leopold, for instance, wrote that "all ethics rest upon a single premise: that the individual is a member of a community of interdependent parts. . . . The land ethic simply enlarges the boundaries of the community to include soils, plants, and animals, or collectively: the land." *A Sand County Almanac* 203 (1968). A major portion of the ecological research agenda concerns tracing the consequences of actions through successively widening sequences of effects.

The first generation of ecologists believed that most ecosystems will exhibit *homeostasis*, or the quality of returning to a self-sustaining equilibrium after being disturbed, unless the disturbance is too great. Homeostasis, which is often referred to as the balance of nature, is a dynamic equilibrium, with prey and predator, competition and coexistence within the system; nevertheless, over the system as a whole and over time, the diversity and complexity of functioning ecosystems produce a stability, or balance. In any ecosystem, the "presence and success of an organism depend upon the completeness of a complex of conditions, while in turn individual organisms contribute to the stability of the system itself by occupying an ecological 'niche'—performing a function that contributes to the stability of the system." See E. Odum, *Fundamentals of Ecology* (3d ed. 1971). This traditional homeostatic understanding has recently been challenged by the "new," or "nonequilibrium" ecology. See the excerpt from Daniel Botkin, page 44, below.

The extent of disruption an ecosystem could absorb and still maintain homeostasis was defined as its "carrying capacity," and this concept played an important role in debates surrounding the environmental laws passed in the early 1970s.

Because ecosystem interconnections can be complex and multifarious, an ecological rule of thumb is that seemingly simple actions typically will have non-obvious and unintended consequences that may culminate in a threat to ecosystem stability. Introduce a new organism into an ecosystem and it may function as a virulent pathogen, like the measles that decimated the Eskimos and South Sea Islanders following their first contacts with Western civilization. Bioaccumulation provides another mechanism through which seemingly discrete actions can have unintended consequences. Chemicals, such as the pesticide DDT, accumulate in the tissue of animals that consume other animals, plants, or water containing the chemical. When these animals are consumed in their turn by still others, the chemicals can continue to accumulate or concentrate until they reach dangerous, even fatal proportions. Both the American condor and the bald eagle populations have suffered because plants and insects sprayed with pesticides were consumed by rodents and snakes that were then consumed by the predator birds, eventually producing pesticide contamination in them sufficient to weaken their egg membranes so that their young died before birth.

A second rule of thumb for ecologists is that smaller actions have less drastic consequences on functioning ecosystems than do larger actions. As Leopold expressed it: "The combined evidence of history and ecology seems to support one general deduction: the less violent the man-made changes, the greater the probability of successful readjustment in the [ecosystem]. Violence, in turn, varies with human population density; a dense population requires a more violent conversion: In this respect, North America has a better chance for permanence than Europe, if she can contrive to limit her density." *A Sand County Almanac*, at 220.

One of the first pieces of modern-era environmental legislation, the National Environmental Policy Act, was partly premised on the idea that interdisciplinary ecological study ought to precede major federal actions in order that the unintended environmental effects of actions could be better represented in an overall cost-benefit assessment of the action. See, for example, section 102(2)(A)-(B), requiring federal agencies to "utilize a systematic,

interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning [and to] insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making. . . .”

Preferring small actions to large ones combines a counsel of caution with an underlying judgment that the ways of nature ought to be respected. The methodological principle of ecology, seeing humans as one constituent member of ecosystems composed of many interdependent parts rather than as a dominant, qualitatively distinct member, combines with an admiration for the homeostatic qualities of “natural” systems to produce a prescription for humans: Live in harmony with nature, not at odds with it. Do not maximize, but rather harmonize. The natural equilibrations of functioning ecosystems come to constitute a norm, and to provide a sense of normality, that humans are urged to respect. A good collection of essays touching on some of ecology’s broader implications is *The Subversive Science: Essays Toward an Ecology of Man* (P. Shepard & D. McKinley eds., 1969).

The preference for smallness blossomed into an entire worldview in the late 1960s and 1970s, stimulated by the publication of E.F. Schumacher’s *Small Is Beautiful* (1973) and I. Illich’s *Tools for Conviviality* (1973). As described by Schumacher,

To strive for smallness means to try to bring organizations and units of production back to a human scale. . . . There are many reasons for favoring smallness. Small units of production can use small resources—a very important point when concentrated, large resources are becoming scarce or inaccessible. Small units are ecologically sounder than big ones: the pollution or damage they may cause has a better chance of fitting into nature’s tolerance margins. Small units can be used for decentralized production, leading to a more even distribution of the population, a better use of space, the avoidance of congestion and of monster transport. Most important of all: small units, of which there can be a great number, enable more people “to do their own thing” than large units of which there can only be a few. Smallness is also conducive to simplicity. Simplicity . . . is a value in itself. [E.F. Schumacher, *The Age of Plenty: A Christian View, in Economics, Ecology and Ethics* 126, 133 (H. Daly ed., 1980).]

The following reading illustrates how the principles of ecology have been combined with ecocentric strands of environmental ethics to produce a distinctive approach to organizing society to respond to environmental problems.

|| *Robert Paehlke, Environmentalism and  
the Future of Progressive Politics* ||  
117-119, 137-145 (1989)

Environmentalism can be seen as a political movement that seeks to impose upon the physical sciences and engineering restraints based on the findings and judgments of the social and life sciences. . . .

Environmentalism involves, in effect, a scientific revolution, a paradigm shift, in the sense developed by Thomas Kuhn. Science can never again be an activity solely devoted to removing humanity from nature, lifting us out of

natural limits—for centuries, if not millennia, its implicit goal. . . . But environmentalism fundamentally shifts the purpose of science. The new science can continue to advance productive efficiency, but that efficiency must also be seen in organic and ecological rather than merely in mechanistic terms. Productivity must be measured by its long-term sustainability rather than by short-term increases in output.

Environmental science assumes that every new technology introduces undesirable and commonly unanticipated impacts. . . . An expanding research emphasis on the negative impacts of science and technology need not diminish our appreciation of their benefits. We must simply acknowledge that every benefit carries costs. . . .

The balance reasonable environmentalists seek involves reminding society that unanticipated costs of negative impacts can be severe, even irreversible. This has happened so often that environmentalists seek to reverse the burden of proof regarding safety of new technologies. Proponents of new technologies and substances should be required to demonstrate their safety. In our court system, people are innocent until proven guilty. But new technologies should be seen as guilty until proven innocent.

On the other hand, environmentalists should grant that nothing is absolutely safe, and that technological decisions must involve consideration of benefits as well as costs. Environmentalists would like such decision-making to be more conscious and democratic than it has been. Someone must speak for other species and for future generations, and we all must be willing to accept less economically desirable options when necessary.

Economics is at the heart of decisions regarding the application and evolution of science, and it is central also to the gulf within science. Scientists have been urged toward economic considerations by both private interests and governments of every ideological perspective. Much of humankind has been freed from resource scarcity by a science guided largely by conventional notions of economic progress. This scientific optimism need not now be rejected, but it does need to be guided by a more complex understanding of progress. . . .

Two other attempts were made to summarize the key characteristics of society and economy anticipated and/or advocated by environmentalists. . . .

The concept of the conserver society was popularized by the Science Council of Canada in its all-time best-selling publication, *Canada as a Conserver Society: Resource Uncertainties and the Need for New Technologies*. The best summary of this concept is the carefully developed definition contained in the report:

A Conserver Society is on principle against waste and pollution. Therefore it is a society which

- promotes economy of design of all systems, i.e., “doing more with less”;
- favours re-use or recycling and, wherever possible, reduction at source;
- questions the ever-growing per capita demand for consumer goods, artificially encouraged by modern marketing techniques; and
- recognizes that a diversity of solutions in many systems, such as energy and transportation, might in effect increase their overall economy, stability, and resiliency.

In a Conserver Society, the pricing mechanism should reflect not just the private cost, but as much as possible the total cost to society, including energy and materials used, ecological impact and social considerations. This will permit the market system to allocate resources in a manner that more closely reflects societal needs, both immediate and long term.

This definition includes many of the goals of environmentalism and many of the findings of environmental science, and it also suggests means by which these goals might be achieved, such as full-cost market pricing and restraints on modern marketing techniques.

The fact of nonrenewability stands at the center of the last conception of environmentalism and environmental science that we will discuss: the sustainable society. The cover of Lester Brown's book [Building a Sustainable Society] summarizes this perspective: "We have not inherited the earth from our fathers, we are borrowing it from our children." Rather than building his concept of environmentalism around avoidance of waste and depletion, Brown chose to emphasize the notion of sustainability, the maintenance and use of the earth's renewable resource base. He stressed the protection of land and soil quality, sustaining biological resources against the pressures of overpopulation and industrialization, the use of renewable energy sources, and the need for population stabilization. In combination, Building a Sustainable Society and Canada as a Conserver Society convey virtually all the major themes rooted in the findings of the environmental sciences. The two concepts of sustainable and conserver societies together capture the essence of moderate environmentalism. . . .

Some environmentalists, particularly in the mid-1970s, felt obliged to deny that environmental values had a significant political dimension. Political solutions were rejected in favor of personal changes, particularly in one's habits as a consumer. Achieving environmental goals solely in this way is only marginally more plausible than achieving socialism through large-scale voluntary charity. Nonetheless, environmentalism as a set of values has an autonomous logical validity apart from the political process, and it ought to be set out separately from environmentalism as an ideology. More important, since politics itself rests on values—it has been defined as "the authoritative allocation of values"—one cannot see clearly the political implications of environmentalism without delineating first its value priorities.

What, then, are the central value assertions of environmentalism? The following have consistently been emphasized in the writing of environmentalists and are implicit in their actions.

1. An appreciation of all life forms and a view that the complexities of the ecological web of life are politically salient.
2. A sense of humility regarding the human species in relation to other species and to the global ecosystem.
3. A concern with the quality of human life and health, including an emphasis on the importance of preventative medicine, diet, and exercise to the maintenance and enhancement of human health.
4. A global rather than a nationalist or isolationist view.
5. Some preference for political and/or population decentralization.

6. An extended time horizon—a concern about the long-term future of the world and its life.
7. A sense of urgency regarding the survival of life on earth, both long-term and short-term.
8. A belief that human societies ought to be reestablished on a more sustainable technical and physical basis. An appreciation that many aspects of our present way of life are fundamentally transitory.
9. A revulsion toward waste in the face of human need (in more extreme forms, this may appear as asceticism).
10. A love of simplicity, although this does not include rejection of technology or “modernity.”
11. An aesthetic appreciation for season, setting, climate, and natural materials.
12. A measurement of esteem, including self-esteem and social merit, in terms of such nonmaterial values as skill, artistry, effort, or integrity.
13. An attraction to autonomy and self-management in human endeavors and, generally, an inclination to more democratic and participatory political processes and administrative structures.

Needless to say, not all environmentalists accept all of these values. Most environmentalists find many of these values central to their outlook on life, but the list is not a catechism.

#### *NOTES AND QUESTIONS*

1. One recurring criticism that Deep Ecology levels at the “problem-solving” approach that typifies much environmental law is that it does not address directly ways in which consumption contributes to environmental problems. Gus Speth argues that “consumer spending has been a leading driver of environmental decline. . . . In the modern environmental era, there has been too little environmental focus on consumption. This situation is changing, but most mainstream environmentalists have not wanted to suggest that the position they advocate would require serious lifestyle changes.” *The Bridge at the End of the World*, supra, at 147-148. Does the idea of a Conserver Society provide a perspective for environmentalists to employ that avoids the pitfall of advocating serious lifestyle changes, or is such advocacy inevitable to get beyond the limitations of the problem-solving approach?

2. An economist would say that consumption takes care of itself once we “get the prices right,” that is, once the price of goods reflects the full environmental costs of producing and delivering them. Do you agree?

Paehlke sketches a distinctive approach to environmental problems rooted in the ecological sciences. How much of that approach would change if the balance of nature, as understood by traditional ecology, were a myth, as the following excerpt suggests?

*Daniel Botkin, Adjusting Law to  
 Nature's Discordant Harmonies*  
 7 Duke Env'tl. L. & Pol'y  
 F. 25-37 (1996)

### I. THE MYTH OF THE BALANCE OF NATURE

There has been a revolution in environmental sciences. At the heart of this revolution is a shift from the old idea of the constancy of Nature which is part of the ancient myth of the Balance of Nature. Briefly stated, the Balance of Nature myth has three basic features: First, Nature, undisturbed by human influences, achieves a permanency of form and structure that persists indefinitely. Second, this permanent condition is the best condition for Nature: best for other creatures, best for the environment, and best for humans. Third, when disturbed from this perfect state, Nature is capable of returning to it. The idea of the Balance of Nature is deeply rooted in our history, civilization, and religions. . . .

Unfortunately, the Balance of Nature myth is not true. During the past 30 years, this has been demonstrated as part of the revolution in environmental sciences. One of the central findings of this scientific revolution is that Nature is characterized by change, not constancy. The environment has always changed, and species have adapted to those changes. If we are to conserve and manage our living resources, then we must understand the naturalness of change, and this requires that we move away from the ancient and pervading myth of the Balance of Nature. . . .

[An] example which demonstrates the dominance of the Balance of Nature myth is the story of Hutchinson Memorial Forest, a nature preserve near to and managed by Rutgers University. . . .

[The Forest was established in the 1950s to preserve the only nevercut Oak-Hickory forest in New Jersey.] Life magazine ran an article showing a drawing of the forest that looked right out of a Walt Disney movie with all the forest creatures happily living together. All the popular articles and advertisements emphasized the idea that here, in Hutchinson Forest, was a natural ecosystem that had taken thousands of years to develop and, if left free from human disturbances, it would persist indefinitely in the beautiful state imagined by Life magazine. . . .

[Records from the 1750s showed] that this area was filled with large trees so widely spaced that [someone] could easily drive a horse and carriage through the forest. So, at that time the area was a picture book idea of an old-growth virgin forest. Today, and when I was a caretaker, the forest had some old trees, but it was primarily a dense thicket of small stems of shrubs and saplings, very hard to walk through, and, as I mentioned before, with the young trees primarily Maple, not Oak.

So Nature was not playing fair by not staying the way it was supposed to stay. It was not remaining a forest of huge, old Oaks and Hickories. It was not the open forest of huge trees. . . . That is one of the problems with studying natural ecological systems, Nature does not play fair in the sense that it does not do what we expect it to do, and therefore want it to do, according to our myths and beliefs.

What was going on here? Why was the forest not remaining in a constant condition and in the specific constant condition people had imagined it should have been in? [By examining tree rings, you can tell how frequently a tree has been scarred by fire. Study of trees felled by a hurricane showed that] there had been fires on the average of every ten years until 1701, and then there had been no fires since that time.

The fires that were common before European settlement were primarily lit by the Indians. The early European explorers, such as Henry Hudson, reported seeing many fires and attributed them to the Indians. There were many different reasons given as to why the Indians lit fires or let them burn once they were started, including: to drive game and to make travel easier. Whatever the reason, these fires were predominantly Indian lit. It turns out that Oak and Hickory are more resistant to fire than Sugar Maple. Therefore, the reason Hutchinson Forest was predominantly an Oak and Hickory forest was because the Native Americans burned it. It was also an open forest because of the fire. If you do not burn this kind of forest, it becomes a dense thicket dominated by Sugar Maple. So with the suppression of fire, Hutchinson Memorial Forest was becoming a forest that nobody had predicted, and I do not think anybody really wanted. It was becoming a scientific experiment, not the conservation of old-growth as originally intended.

What this suggests is that often what we really admire and appreciate about Nature, and think of as natural, has been heavily influenced by human beings. But the old Balance of Nature paradigm assumes that Nature remains in a single, constant condition which is the most desirable. This implies that people should leave Nature alone if we want Nature to attain its most desirable condition. Nature is perfect without human influence. Therefore, we have no place within Nature.

As I stated earlier, the new findings in ecology show that natural ecological systems are dynamic—always changing—and, as illustrated by Hutchinson Memorial Forest, sometimes the changes that are desirable are those induced through human action. In these ways, a nature preserve is different from a jar of strawberry preserves. However, we have acted as if the two were much the same: as with strawberry preserves, a nature preserve merely needed to be set aside and left alone.

Hutchinson Forest is not unique. The more that we study the history of natural areas, the more that we find that pre-industrial societies have altered the environment, often in ways that we like and that we think of as natural. As a result, we have to rethink how people and civilization fit with Nature.

## II. IMPLICATIONS OF THE PARADIGM SHIFT

What are the implications of these changes in our understanding of natural ecological systems and the relationship between people and Nature for laws and policy? I will illustrate some implications by way of another example. I was asked by the State of Oregon to direct a study about salmon and their habitat. The central questions to be answered were: (1) what was the relative effect of forest practices on salmon; and (2) what could be done to better improve the conservation and management of salmon? We were asked to

study Western Oregon south of Columbia River to the Klamath River in California, an area that includes 26 rivers that reach the Pacific Ocean.

There are five important species of salmonids in this area: chum, coho, chinook, steelhead trout, and cutthroat trout. They spawn, hatch, and rear in the streams and rivers. The young fish stay in fresh water for about a year—the time varies with the species. During this early phase of their lives, the salmon are subject to short-term environmental variations such as annual variations of water flow and changes in the seasons which affect the vegetation along the streams. They are also subject to gradual, long-term changes in the condition of the forest. When the salmon swim out to the ocean where they typically remain for two to six years, depending on the species, they are affected by other kinds of environmental variations. These variations include changes in the ocean currents.

Moreover, salmon are fish of northern waters, so over centuries they have had to adapt to existing in rivers which freeze in the winter yet thaw in the summer, allowing the fish to spawn. In addition, in the Pacific Northwest, rivers and streams are subjected to volcanic eruptions, mud slides, forest fires, and other environmental variations that affect the stream habitats over significant periods of time.

The standard story about salmon is that they always return to the stream where they were spawned. But this is not quite the case. About fifteen percent of the adults return to a different stream from the one in which they were spawned. Given the variations in the environment, the ability to find new streams for spawning is essential to the survival of the species. The ability of individual salmon to adapt is essential to the existence of the species because it allows salmon to adapt to very slow environmental changes.

There is a common set of beliefs about salmon in Oregon that needs to be addressed. The important beliefs for our purposes are: (1) prior to European settlement, there was a superabundance of salmon; (2) the number was constant from year to year; (3) old-growth forests covered the entire area; (4) the great abundance of salmon was due to the existence of the continuous cover of old-growth forests. Here, among the common beliefs about salmon, we find a reassertion of the myth of the Balance of Nature.

One would think the state of Oregon would have a lot of information about this subject since they were paying for the project, but in actuality the state did not. . . . It was difficult to find data, but once some were obtained, even the simplest analyses yielded useful results. . . . We found that salmon were counted on only two of those rivers in a statistically valid way: the Rogue and the Umpqua Rivers.

Upon commencing the study, it was discovered that the number of adult salmon returning to spawn varied tremendously. Variation, rather than constancy, was the rule. But how have the salmon been managed? It is generally assumed that, without human harvest, the number of returning salmon would be the same year after year, unaffected by changes in the environment. This assumption is set forth mathematically in standard fishery harvest models. However, major fisheries relying on such harvest models have failed to maintain their fish levels. These failures call into question the validity of the assumption that without human intervention the salmon population would remain constant year after year.

Therefore, while conducting the study, we decided to avoid assumptions accepted prior to the examination of the facts. We also searched for available data, analyzed that data, and let new generalizations emerge from the data analysis. . . .

Attributes of our approach were openness and democracy. We listened to public, national, and local interest groups, and both nongovernmental and governmental organizations. We also held open meetings because we wanted to learn from the public and to relay information to the public as we uncovered it. . . .

We performed statistical analysis on [water flow data on the Rogue and Umpqua Rivers] and discovered that water flow accounted for a large percentage in the variation in fish returns during the past 20 years on the Rogue River.

What we had done was to turn the standard beliefs upside down. Instead of avoiding environmental variation and assuming that it did not exist, we used environmental variation as the basis for prediction and therefore as a basis for policy. Using [the fact that water flow in the year the fish were hatched bore a strong relationship to the number of adults returning three and four years later,] we developed a new tool that allowed an estimate to be made three years in advance about whether a year was likely to be a good one for salmon harvests. . . . Under the old methods, the allowable harvest is set during the present year sometimes close to the harvest time which allowed fishermen little time to plan and little flexibility. . . .

By learning to understand the dynamic of these systems, we can make better forecasts and make better laws and policies than we ever could previously. It is not clear if the people in management will actually use these new ideas, because they may still be locked in the old way of thinking. Policy-makers, and we as scientists, need to move away from the old beliefs about nature.

It may seem quite strange that there is such lack of interest in using data. Part of the reason for this, I believe, can be traced back to the myth of the Balance of Nature. As I have tried to make clear, this myth involves the idea that Nature knows best and will always move itself to a perfect, constant state. If this were true, then you would not have to know anything about Nature in order to manage it, data would have no importance. Nature would take care of itself; knowledge would not be important. This produces a strange irony in the late twentieth century "information age." The failure to use the data about adult fish returns, or to seek to obtain such data in a statistically valid way, is typical. Whenever I have been asked to examine an environmental problem, I have found that key information is lacking. . . .

Not only do we tend to formulate policy from myths about Nature, we also formulate policy based on what appears plausible, whether or not there are facts to support it. As an example from Oregon, in the 1940s people watching salmon swimming up stream noticed that in drought years the fish had trouble going over logs that had fallen across the streams. Many of these logs were large and, because they were submerged in water, decayed slowly. The logs had considerable value, especially during World War II. So a plan was devised to harvest all these logs on many streams throughout the state. The negative effect of the log debris in the streams on salmon seemed plausible. Both salmon and the war effort could be helped at the same time. No one conducted a test study to determine if the removal was actually beneficial. The result was a disaster for

salmon. Those logs were fundamental to the structure of salmon breeding habitat. Thus, by removing the logs, the salmon habitat was destroyed. To correct for this past mistake, the Oregon Department of Fish and Wildlife is spending over \$30,000 a mile to put logs back into the streams and anchor them. But are they doing tests to see if this works? No. I went out with some of the Department's staff and asked whether they counted the returning fish before they started putting logs back in the streams. No. I asked if they were counting the fish now. No. Were they doing any comparative studies? No. So the action had changed, but the approach was the same: do what seems plausible.

#### CONCLUSION

I have discussed some of the implications of new ideas in ecology upon environmental laws and policies. There has been a revolution in ecology, in fact in all environmental sciences, during the last 30 years. However, our laws and policies are still based on old, now outmoded, concepts, especially on the myth of the Balance of Nature. That myth not only tells us that Nature, undisturbed by human actions, will remain constant, but also that this constant state is the most desirable. Thus, Nature knows best. A corollary of this belief is that to manage our natural resources we do not need any information, we need only to leave Nature alone and it will find the correct state. Laws and policies based on this belief have dominated natural resource management in the twentieth century. As a result, there has been little emphasis on data. In addition to a dependency on outmoded concepts, environmental laws suffer from a dependency on what I have referred to as arguments from plausibility rather than arguments based on scientific information.

#### NOTES AND QUESTIONS

1. What are the implications of the "new ecology" for environmental policy and hence environmental law? Several scholars have begun to address this question. See, e.g., Tarlock, *Slouching Toward Eden: The Eco-Pragmatic Challenges of Ecosystem Revival*, 87 *Minn. L. Rev.* 1173 (2003); Wiener, *Law and the New Ecology: Evolution, Categories, and Consequences*, 22 *Ecology L.Q.* 325 (1995); Meyer, *The Dance of Nature: New Concepts in Ecology*, 69 *Chi.-Kent L. Rev.* 875 (1994). The notes that follow raise some of the considerations.

2. Those views of environmental ethics that draw on ecology stress that humans are but one element in a complex, interrelated system of elements, each of which is entitled to respect. Adherents of such ecocentric perspectives contrast their views with the human-centered principle that actions are good or bad insofar as they benefit or harm humans alone. How, if at all, do you think the "new ecology" as described in the preceding article might affect ecocentric perspectives on environmental ethics?

3. In his book *Ecology and the Politics of Scarcity*, William Ophuls provides the following statement of "the essential message of ecology."

[A]lthough it is possible in principle to exploit nature rationally and reasonably for human ends, man has not done so. Because he has not been content with the portion naturally allotted him, man has invaded the biological capital built up by evolution. Moreover, due to man's ignorance of nature's workings, he has done so in a peculiarly destructive fashion. . . . We must learn to work with nature and to accept the basic ecological trade-offs between protection and production, optimum and maximum, quality and quantity. This will necessarily require major changes in our life, for the essential message of ecology is limitation: there is only so much the biosphere can take and only so much it can give, and this may be less than we desire. [W. Ophuls, *Ecology and the Politics of Scarcity* 43 (1977).]

How must Ophuls's "essential message" be modified, if at all, if the new ecology is sound?

4. How will ecology's contribution to the assessment of the consequences of human actions be affected by the new ecology? Has the science of ecology been made less relevant or more relevant to a careful evaluation of costs and benefits of large-scale human action? If there are no "natural" states to use as benchmarks, does calculating harm and benefit become more difficult, less difficult, or remain the same? How about deciding what is a harm or a benefit in the first place?

5. Is the ultimate objective of environmental policy to answer the question Christopher Stone poses: What sort of planet will this be? Stone argues that while technology and resource constraints define the range of future options that we realistically can seek, environmental ethics seek to tell us which of these alternative futures we ought to select. Environmental law, then, seeks to determine how we can arrange our social institutions in order to achieve the future that we want. C. Stone, *Earth and Other Ethics* 15-16 (1987). What obligation do we have toward future generations when making choices concerning what sort of planet this will be? Do we have an obligation to leave future generations at least the same range of choices that we have? Or do we owe them some lesser obligation because they depend on us for their existence and their values will be influenced by the state of the world we choose to leave them? How would proponents of the economic perspective approach these questions? The ecological perspective?

## E. COMMON POOL RESOURCES

Previous discussions have already explained how we tend to overuse our environmental resources because they are available without cost to us, so that the price mechanism does not make us aware of the harm we are causing to other humans or the environment. That harm is thus external to our private calculations concerning how much of the resource we should use. A good many environmental issues present this problem of external costs in ways that share a common structure. The essence of that structure is captured in this classic article.

|| *Garrett Hardin, The Tragedy of the Commons* ||  
 168 Science 1243 (1968)

The tragedy of the commons develops in this way. Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.

As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component.

(1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1.

(2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1.

Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another, and another. . . . But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. . . .

In an approximate way, the logic of the commons has been understood for a long time, perhaps since the discovery of agriculture or the invention of private property in real estate. But it is understood mostly only in special cases which are not sufficiently generalized. Even at this late date, cattlemen leasing national land on the western ranges demonstrate no more than an ambivalent understanding, in constantly pressuring federal authorities to increase the head count to the point where overgrazing produces erosion and weed-dominance. Likewise, the oceans of the world continue to suffer from the survival of the philosophy of the commons. Maritime nations still respond automatically to the shibboleth of the "freedom of the seas." Professing to believe in the "inexhaustible resources of the oceans," they bring species after species of fish and whales closer to extinction.

The National Parks present another instance of the working out of the tragedy of the commons. At present, they are open to all, without limit. The parks themselves are limited in extent—there is only one Yosemite Valley—whereas population seems to grow without limit. The values that visitors seek in the parks are steadily eroded. Plainly, we must soon cease to treat the parks as commons or they will be of no value to anyone.

What shall we do? We have several options. We might sell them off as private property. We might keep them as public property, but allocate the right to enter them. The allocation might be on the basis of wealth, by the use of an auction system. It might be on the basis of merit, as defined by some agreed-upon standards. It might be by lottery. Or it might be on a first-come, first-serve basis, administered to long queues. These, I think, are all the reasonable possibilities. They are all objectionable. But we must choose—or acquiesce in the destruction of the commons that we call our National Parks. . . .

In a reverse way, the tragedy of the commons reappears in problems of pollution. Here it is not a question of taking something out of the commons, but of putting something in—sewage, or chemical, radioactive, and heat wastes into water, noxious and dangerous fumes into the air; and distracting and unpleasant advertising signs into the line of sight. The calculations of utility are much the same as before. The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them. Since this is true for everyone, we are locked into a system of “fouling our own nest,” so long as we behave only as independent, rational, free-enterprisers.

The tragedy of the commons as a food basket is averted by private property, or something formally like it. But the air and waters surrounding us cannot readily be fenced, and so the tragedy of the commons as a cesspool must be prevented by different means, by coercive laws or taxing devices that make it cheaper for the polluter to treat his pollutants than to discharge them untreated. We have not progressed as far with the solution of this problem as we have with the first. Indeed, our particular concept of private property, which deters us from exhausting the positive resources of the earth, favors pollution. The owner of a factory on the bank of a stream—whose property extends to the middle of the stream—often has difficulty seeing why it is not his natural right to muddy the waters flowing past his door. The law, always behind the times, requires elaborate stitching and fitting to adapt it to this newly perceived aspect of the commons.

### *NOTES AND QUESTIONS*

1. Hardin's story of the commons is a “tragedy” because a dynamic is at work within the story that is leading to eventual disaster, disaster for all. What is that dynamic?

Insofar as the dynamic relates to the desire of “each herdsman to maximize his gain,” is the tragedy unavoidable? Many who disagree with the economic approach to environmental problems do so because they believe humans ought not, and need not, pursue their own “gain” single-mindedly. Aldo Leopold, for one, claimed that anyone approaching the environment as exclusively an object for personal gain in effect treated it as a piece of property, “entailing privileges but not obligations.” In arguing for a “land ethic,” he argued for a change in humanity's disposition toward the environment, one that “changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. [This] implies respect for his fellow-members, and also respect for

the community as such." A. Leopold, *A Sand County Almanac* 204 (1968). This idea has been widely influential among environmentalists. For summaries and appraisals, see Meyers, *An Introduction to Environmental Thought: Some Sources and Some Criticisms*, 50 *Ind. L.J.* 426 (1975); Heffernan, *The Land Ethic: A Critical Appraisal*, 4 *Envtl. Ethics* 235 (1982); C. Stone, *Earth and Other Ethics* (1987).

2. Surely the tragedy of commons is not inevitable, as other studies have shown, because some commons have existed for centuries, and continue to exist. E. Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (1990). As one study suggests, "Perhaps what existed in fact was not a 'tragedy of the commons' but rather a triumph: that for hundreds of years—and perhaps thousands, although written records do not exist to prove the longer era—land was managed successfully by communities." Cox, *No Tragedy of the Commons*, 7 *Envtl. Ethics* 49, 60 (1985). Small communities are likely to be more successful at avoiding the tragedy through informal controls so long as there are no external markets for the resources. Cultural anthropologists, including especially students of Native American cultures, have identified cultural and ideological explanations for husbanding commons resources. Moreover, as Carol Rose points out, the tragedy occurs only when use of the commons reaches a level where congestion develops or where the resources are used so intensively that it exceeds the carrying capacity of the commons. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 *Duke L.J.* 1.

3. The type of situation exemplified by Hardin's article is often called a "common pool resource" problem (CPR). CPRs are sometimes analyzed through a model of behavior known as the Prisoner's Dilemma, named for the story used to illustrate the behavior. In that story, two persons suspected of a serious crime are isolated from each other and told that if either testifies against her colleague she will go free, so long as the other suspect doesn't also turn state's evidence, in which case each will receive a moderate sentence. If neither suspect testifies, then each will be convicted of a lesser crime, for which there already is sufficient evidence. Each will then receive a light sentence for the lesser crime. However, if one suspect keeps quiet while the other testifies, the silent suspect will receive a harsh sentence.

From the perspective of any single suspect, each gets a shorter sentence by testifying against the other, regardless of what the other one does. Thus the strategy of testifying "dominates" any other strategy that the suspect could choose, and any suspect interested in minimizing his or her sentence should adopt it. However, the final result of both actors following this strategy is that they each get moderate sentences, which is worse for each than if they had both kept silent, in which case each would have received a light sentence.

The result of the prisoner's dilemma is an outcome that is "individually rational and collectively deficient." B. Barry & R. Hardin, *Rational Man and Irrational Society?* 25 (1982). It is individually rational because each player chooses her dominant strategy, which is the rational thing to do. It is collectively deficient because there exists another outcome that would leave each suspect better off than the all-testify outcome. This individual rationality and collective deficiency identifies the problem of collective action, namely that "it may be in

everyone's individual interest not to cooperate in a collective effort even though everyone would be better off if everyone cooperated." *Id.*

4. Some have urged that organizing collective action to prevent tragedies of the commons should constitute a primary function of government. The late Mancur Olson, for instance, wrote that "[a] state is first of all an organization that provides public goods for its members, the citizens." M. Olson, *The Logic of Collective Action* 15 (1965). Long before the problem of collective action became identified as such, theorists had observed that such cases were ones in which government might legitimately intervene, and even writers not otherwise associated with interventionist views about government have concluded that prisoner's dilemma cases provide a legitimate occasion for intervention. For example, John Stuart Mill wrote:

There are matters in which interference of law is required, not to overrule the judgment of individuals respecting their own interest, but to give effect to that judgment; they being unable to give effect to it except by concert, which concert again cannot be effectual unless it receives validity and sanction from the law. [J.S. Mill, *Principles of Political Economy*, Bk. V., Chap. XI, Sec. 12.]

Mill suggested that "I would rather cooperate than welch, but only if you cooperate" is an individually rational judgment in some circumstances, and that it may require legal sanction to ensure universal cooperation, which all seem to desire.

5. Others have argued that privatizing the commons by creating property rights in common resources is a solution superior to government regulation of access. Jim Krier cautions that there are difficulties with either approach. Given that the root of the tragedy of the commons is the difficulty of coordinating human behavior, Krier questions whether proponents of these approaches are "implicitly arguing that a community plagued by noncooperation can improve its condition by cooperating." Krier, *The Tragedy of the Commons*, Part Two, 15 *Harv. J.L. & Pub. Pol'y* 325, 338 (1992). Krier claims that because the public must organize in order to get the government to intervene to protect the commons, the problems of free riders and factional influence persist. Because "markets themselves depend on an active governmental role," Krier finds no reason to believe that the same governmental failures that plague regulatory programs will not plague the establishment and oversight of new natural resources markets. *Id.* at 341-342.

#### **PROBLEM EXERCISE: ARCTIC OIL EXPLORATION, THE KEYSTONE XL PIPELINE, AND HYDRAULIC FRACTURING**

Rising global demand for energy has spurred multinational oil companies to explore for oil in deeper waters and in more remote parts of the globe. On April 20, 2010, two days before the 40th anniversary of Earth Day, an explosion and fire on the Deepwater Horizon offshore oil platform killed 11 workers. The platform, located 41 miles off the coast of Louisiana in the Gulf of Mexico, had been drilling the Macondo well for the British oil company BP. For nearly three months until it was finally capped on July 15, 2010, oil gushed from the bottom

of the Gulf, creating the largest accidental marine oil spill in history. A major reason why it was so difficult to contain the spill was that it occurred in waters nearly a mile deep.

### *The Arctic National Wildlife Refuge (ANWR)*

Oil companies are eager to explore for oil in remote areas north of the Arctic Circle. For decades they have pushed the U.S. government to permit them to drill in the Arctic National Wildlife Refuge (ANWR), a pristine wilderness area along the northeast coast of Alaska. Sometimes called North America's Serengeti, the area is home to a vast herd of porcupine caribou whose migratory range extends over 96,000 square miles. It is the kind of place most Americans encounter only in the pages of National Geographic, which describes it as "a land of mountains and broad, lake-filled plains, where caribou have worn trails in rock and geese have traced paths in the sky over millennia of rhythmic wandering; where ice holds the sea and frost the land until a brief, glorious burst of flowering summer; . . . a roadless land, a part of the North little touched by the 20th century, or the 19th, or the first." Lee, *Oil in the Wilderness: An Arctic Dilemma*, National Geographic, Dec. 1988, at 858. The late Alaska Governor Wally Hickel, who pushed to open ANWR to oil drilling, described it instead as "a barren, marshy wilderness in the summer, infested with uncountable mosquitoes, and locked in temperatures of 60 and 70 degrees below zero for up to nine months of the year."

ANWR was established by Congress in 1960 when it set aside 19 million acres of land, half of it as wilderness area. But Congress also designated 1.5 million acres along the coast ("section 1002 lands," named after the section of the statute creating the category) for further study for possible oil exploration.

Located 40 miles east of North America's largest oil field at Prudhoe Bay, these section 1002 lands represent "the chance of a lifetime to search for 'elephants'—oil fields with more than a hundred million barrels of producible reserves—in perhaps the last major hunting ground on North America's mainland." *Id.* at 863. The U.S. Geological Survey initially estimated the amount of recoverable oil in ANWR as ranging from 5.7 to 16 billion barrels of oil (BBO), with a mean value of 10.4 BBO.

The Department of the Interior (DOI) has performed numerous assessments of the environmental impact of drilling in ANWR. One forecast negative "widespread, long-term changes in wildlife habitats, wilderness environment, and Native community activities," and possibly a "major population decline" in the caribou herd. Another forecast only that "there is a risk that a decline could occur" in the caribou population, but it anticipated "no appreciable population decline."

A study by the U.S. Fish and Wildlife Service found that the environmental impact of oil drilling in Prudhoe Bay had been far greater than estimated in the environmental impact statements prepared when the project was considered 15 years before. It noted that 11,000 acres of wildlife habitat had been destroyed, nearly twice what had been predicted, and that the populations of bears, wolves, and other predators, and most bird species had declined. Although caribou had increased in number, the report attributed this increase to a decline in the numbers of bears and other caribou predators. It noted that more than 200

million gallons of fresh water unexpectedly were being withdrawn from lakes and streams by oil operations each year and that erosion, sedimentation, and oil spills had done far more damage to water quality than anticipated.

Nine months before the *Exxon Valdez* oil spill occurred in Prince William Sound, the New York Times published an editorial supporting the opening of ANWR to oil exploration. *Risks Worth Taking for Oil*, N.Y. Times, June 2, 1988, at A26. While conceding that "drilling is certain to disrupt the delicate ecology of the Arctic tundra," the editorial opined that "the likely value of the oil far exceeds plausible estimates of the environmental cost." The editorial concluded: "If another oil field on the scale of Prudhoe Bay is discovered, developing it will damage the environment. That damage is worth minimizing. But it is hard to see why absolutely pristine preservation of this remote wilderness should take precedence over the nation's energy needs." While it briefly looked likely that Congress would open ANWR to oil drilling, the March 1989 *Exxon Valdez* oil spill temporarily foreclosed that option.

Considerable uncertainty surrounds projections concerning the environmental impact of development at ANWR. In the Clinton administration, which opposed drilling, DOI forecast more environmental damage than previously, concluding that drilling would result "in a major, adverse impact on the [caribou] herd" and damage to water supplies and fragile tundra vegetation. Kenworthy, *Study Condemns Arctic Oil Drilling*, Wash. Post, Aug. 27, 1995, at A4. Proponents of drilling argue that new drilling technologies permit drilling to be done with a "dramatically reduced . . . footprint on the tundra, minimiz[ing] waste produced, and protect[ing] the land for resident and migratory wildlife. . . . Estimates indicate that no more than 2,000 will be disturbed." Bush Administration National Energy Plan 5-9 (2001).

Native Americans living in remote villages near ANWR have a very different perception of what the ANWR battle is about. To Sarah James, a Gwich'in from Arctic Village, Alaska, it "is not just an environmental issue." Rather,

[i]t is about the survival of the ancient culture that depends on the caribou. It is about the basic tribal and human rights to continue [our] way of life. For thousands of years we have lived with the caribou right where we are today. We are talking about an Indian nation that still lives on the land and depends on the herd. In my village 75 percent of protein comes from caribou. It's not just what we eat. It is who we are. Caribou are our life. It's in our stories and songs and the whole way of the world. [S. James, Testimony before a Subcomm. of the Senate Environment and Public Works Comm. (Mar. 1991).]

In contrast to the Gwich'in, Inupiat Eskimos argue that ANWR should be opened to oil exploration because of the economic benefits development will provide. The Arctic Slope Regional Corporation, which represents the Inupiat of the North Slope, owns 92,000 acres of land that they wish the oil companies to develop. An Inupiat representative argues that as a result of development at Prudhoe Bay,

[r]evenues from the only economy we have—the oil industry—have provided high schools in each of our eight villages for the first time in our history. We now have health clinics, utilities, a local senior citizens' home and other basic public services that most Americans take for granted. [Letter from Brenda Ita-Lee, Vice President for Human Resources, Arctic Slope Regional Corporation, to the editors, Wash. Post, Aug. 28, 1991.]

In March 2003, a committee of the National Research Council of the National Academy of Sciences released a report on the "Cumulative Effects of Oil and Gas Activities on Alaska's North Slope." The report, which had been requested by congressional proponents of opening ANWR, confirmed that oil companies have reduced the "footprint" of their drilling technologies, but it also found that oil exploration in Alaska has produced "a steady accumulation of harmful environmental and social effects that will probably grow as exploration expands." Andrew C. Revkin, *Experts Conclude Oil Drilling Has Hurt Alaska's North Slope*, N.Y. Times, Mar. 5, 2003, at A15.

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**Question One.** If it in fact is true that there is far more recoverable oil available in the Arctic than previously estimated and that new technologies will minimize environmental damage, should ANWR be opened to oil drilling?

**Question Two.** How much confidence in projections of environmental impact should be required before a decision concerning a major development project is based on them? Should it depend on the likely magnitude of the consequences? On their reversibility? Is the source of such predictions relevant to assessing their credibility?

**Question Three.** In light of the different perspectives on Arctic drilling by the Gwich'in and Inupiat tribes, does Arctic oil drilling raise environmental justice concerns? How should such concerns be factored into the decision-making calculus?

### *The Outer Continental Shelf Off the Northern Coast of Alaska*

After repeated efforts to get Congress to authorize drilling in ANWR failed, oil companies have now shifted their attention to the Outer Continental Shelf (OCS) off the northern coast of Alaska, a region that also holds promise for new production. This remote environment poses unusual challenges to oil drilling particularly because it is covered with ice for eight months of the year. Environmentalists argue that drilling in this harsh environment is simply too risky particularly in light of extreme weather conditions that prevail during most of the year. Frances Beinecke, president of the Natural Resources Defense Council (NRDC) who was a member of the president's commission that investigated the BP spill, argues that offshore drilling in northern Alaska would be "a reckless gamble we cannot afford" because the harsh conditions there would make it far more difficult to contain and remediate an oil spill than it was in the Gulf of Mexico. Frances G. Beinecke, *No to Arctic Drilling*, N.Y. Times, Aug. 17, 2011. In June 2011, the U.S. Geological Survey issued a report that succinctly summarizes the many uncertainties surrounding the environmental impact of drilling in this remote area. U.S. Geological Survey, *An Evaluation of the Science Needs to Inform Decisions on Outer Continental Shelf Energy Development in the Chukchi and Beaufort Seas, Alaska* (<http://pubs.usgs.gov/fs/2011/3048/>).

The Obama administration has opposed drilling in ANWR, but it has supported drilling in the OCS off northern Alaska as part of its "all-of-the-above approach" to achieving energy independence. On August 4, 2011, the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) granted

conditional approval to Royal Dutch Shell PLC for exploratory drilling in the Beaufort Sea in July 2012. Despite spending more than \$5 billion over six years to obtain this permission, Shell encountered severe problems when it started to drill. Shell's Noble Discoverer drilling ship experienced an engine fire in December 2012 and on January 1, 2013, Shell's drilling ship Kullak ran aground. On February 27, 2013, Shell announced that it would postpone oil drilling in Arctic waters until at least the summer of 2014. ConocoPhillips and Statoil ASA have delayed their planned Arctic offshore drilling from 2014 to at least 2015. Ben Lefebvre & Tom Fowler, Conoco Halts Arctic Drilling Plans, *Wall St. J.*, Apr. 11, 2013, at B7. Chastened by its experience in the more temperate Gulf of Mexico, BP has stated that it does not plan to drill in Arctic waters because the company believes it is too risky.

Economists Robert Hahn and Peter Passell believe that the question whether to drill in ANWR and the OCS can be informed through the use of cost-benefit analysis. They believe that seven billion barrels of oil could be extracted from ANWR and 11 billion from the OCS. At crude oil prices of \$100/barrel, they calculate that this oil would be worth \$2.1 trillion while costing less than \$400 billion to develop (even including the cost of cleaning up oil spills). Hahn and Passell concede that this expanded production would have a barely discernible impact on global oil prices (reducing them by just 1.3 percent), but they argue that the \$1.7 trillion in net benefits presents a "compelling" case for expanded drilling. They argue that the value of keeping ANWR and the OCS unspoiled by oil drilling cannot possibly be this great, and they suggest cutting a deal with environmentalists. Environmentalists should be willing to accept such drilling if they were promised that the government would use hundreds of billions of dollars of the net benefits of drilling to restore environmental treasures like the Everglades and Louisiana coastal wetlands. See Robert Hahn & Peter Passell, *Save the Environment: Drill, Baby, Drill*, *N.Y. Times*, Sept. 14, 2008.

**Question Four.** Should oil drilling on the OCS off the north shore of Alaska be permitted? Whose assessment of the risks of such drilling should be accepted? Would it be better to allow drilling in ANWR rather than on the OCS because it would be easier to contain an oil spill on land?

**Question Five.** How would you respond to the analysis by economists Hahn and Passell? Do you perceive any flaws in their calculations of net benefits from drilling? Should environmentalists be willing to accept a deal where a significant portion of the enormous value of the additional oil is reinvested in projects that would benefit the environment?

#### *Canada's Tar Sands and the Keystone XL Pipeline*

As this edition of the casebook goes to press, a fierce battle is being waged over whether President Obama and the U.S. State Department should approve construction of another phase of the Keystone Pipeline System, known as Keystone XL. This pipeline would carry crude oil from tar sands deposits in the Canadian province of Alberta more than 1,100 miles south to an existing pipeline terminal in Steele City, Nebraska. In January 2012, President Obama rejected the first route proposed for Keystone XL because it crossed through the environmentally sensitive Sandhills region of Nebraska and above the Ogallala Aquifer, a precious source of water for agriculture. TransCanada, the company

seeking to build the pipeline, then proposed a new route that would skirt around the Sandhills. In January 2013, the new route was endorsed by the state of Nebraska, which previously had opposed the pipeline.

Environmentalists continue to object vehemently to Keystone XL because the oil it would carry is unusually carbon-intensive. The State Department's draft Supplemental Environmental Impact Statement (SEIS), released on March 1, 2013, reports that lifecycle greenhouse gas (GHG) emissions from tar sands crude could be 81 percent greater than emissions from the average crude refined in the United States in 2005. Because the pipeline would facilitate the sale of such GHG-intensive crude for many years to come, environmentalists have been so outraged by the project that they have engaged in protests that involve civil disobedience.

Despite the GHG-intensive nature of the tar sands oil, the draft SEIS argues that Keystone XL will not have a significant impact on the environment because the oil will be extracted even if the pipeline is not approved. The oil could be transported by rail or through an alternative pipeline that would extend west from Alberta to the Pacific Ocean. Environmentalists argue that if President Obama vetoes the Keystone XL it will make it much more difficult for the tar sands to be developed. On April 22, 2013, the U.S. Environmental Protection Agency (EPA) submitted comments on the draft SEIS questioning its central assumption that the oil sands crude will find its way to market whether or not the pipeline is built. EPA argued that alternative transportation options could be more costly and congested. The agency also noted that the 2010 Enbridge spill of tar sands crude in Michigan demonstrated that it is far more difficult to remediate spills of such oil than conventional oil spills because tar sands crude does not appreciably biodegrade. Proponents of the pipeline argue that it will create numerous construction jobs in the United States while reducing U.S. dependence on supplies of crude oil from the volatile Middle East.

**Question Six.** Should President Obama and the State Department approve the Keystone XL pipeline? How should the apparent tradeoff between jobs and the environment be reconciled? If it proves true that the tar sands crude will be extracted by Canada regardless of whether the pipeline is built, is the draft SEIS correct in saying that the approval of Keystone XL would not have a significant effect on the environment?

### *Hydraulic Fracturing for Oil and Natural Gas*

Although the United States has only 2 percent of the world's oil reserves, it has one of the world's largest technically recoverable reserves of shale gas. In a few short years the U.S. energy supply mix has been dramatically altered by a surge in extraction of natural gas from shale formations. This phenomenon is the result of a dramatic expansion in the use of hydraulic fracturing, commonly referred to as "fracking." Fracking is a technique involving underground injection of a mix of chemical fluids under high pressure to fracture and hold open shale formations to release hydrocarbons held within them. Due to expanded use of fracking, U.S. natural gas production rose from 20.2 trillion cubic feet in 2007 to 25.3 trillion cubic feet in 2012. Production from shale gas wells rose between 2007 and 2011 from less than 2 trillion cubic feet to more than 8.5 trillion cubic feet. As a result of this huge expansion in domestic supply, natural gas prices in the United States plunged from more than \$9 per million

Btus in 2008 to less than \$3 per million Btus. Plunging natural gas prices have encouraged U.S. electric utilities to shift away from coal-fired generation in favor of natural gas. This has helped reduce U.S. emissions of greenhouse gases to their lowest level since 1994. Fracking also has increased domestic oil production from 5.0 million barrels per day (bpd) in 2008 to 6.5 million bpd in 2012. U.S. Energy Information Administration, *Annual Energy Outlook 2013* (April 2013). If this trend continues the United States may no longer need to import any foreign oil by the mid-2030s.

Despite its immense economic benefits, fracking raises a host of serious environmental concerns. Fracking fluids include many toxic chemicals that can pollute underground aquifers that are sources of drinking water through surface spills or poor well casing and/or cementing. These chemicals are mixed with huge volumes of water—in some cases up to 7 million gallons per well. Special care is required to dispose of wastewater generated by fracking operations. Often this is injected deep below the water table and in a few cases underground injection has been associated with small earth tremors. Fracking operations also release toxic air pollutants, including benzene and methane, a potent greenhouse gas. Fracking operations also are noisy and require a procession of heavy vehicles and equipment that industrialize rural areas and quickly deteriorate rural roads.

Companies that use fracking to increase gas and oil production acknowledge that it poses environmental risks, but they maintain that the risks are not great and are outweighed by its enormous benefits. They note that fracking fluids are injected into wells lined with steel casings that are cemented together. They also maintain that the surface footprint of fracking operations has been greatly reduced due to technology that allows drilling horizontally for up to two miles from eight wells located together on a three-acre pad.

Many members of the public find it disquieting that most fracking operations are exempt from federal environmental regulation. The Safe Drinking Water Act directs EPA to regulate underground injection to protect public water supplies, but fracking operations that do not use diesel fuel as an additive are excluded from the definition of “underground injection.” This provision, contained in section 322 of the Energy Policy Act of 2005, 42 U.S.C. §300h(d), is often called the “Cheney exclusion” because it was quietly slipped into the Act at the behest of Vice President Cheney. In 2010 Congress directed EPA to study the environmental impact of fracking, but the study is not expected to be completed until 2014.

With fracking largely exempt from the federal regulation, states have employed a diverse array of approaches to regulating fracking. Fracking is now employed in 34 states, but only a handful have regulated it stringently. Fracking has been used extensively in Pennsylvania and operators are required to obtain a permit from the state Department of Environmental Protection, but state law preempts local zoning and land use control laws from blocking fracking operations. Shawna Bligh & Chris Wendelbo, *Hydraulic Fracturing: Drilling Into the Issue*, 27 *Nat. Resources & Env't* 7 (Winter 2013).

Alaska and Florida have no laws governing fracking. Vermont has banned all fracking activities within the state. Maryland has imposed a moratorium on fracking until a study of its environmental risks is completed. Some states require disclosure of chemicals used in fracking fluid, but the gas and oil industry has resisted such requirements, claiming that the composition of fracking fluid is a trade secret.

**Question Seven.** Fracking has split the environmental community. Some groups support a complete ban on fracking because of what they perceive as serious risks to the environment. A few groups, emphasizing the environmental benefits of a shift away from coal toward natural gas, believe that fracking can be done safely if properly regulated. Should fracking be banned? How should the environmental benefits of increased use of natural gas instead of coal (reduced greenhouse gas emissions and reduced pollution from coal combustion) be factored into this decision?

**Question Eight.** Should fracking be exempt from federal environmental laws, such as the Safe Drinking Water Act that is intended to protect underground sources of drinking water by regulating underground injection? What are the benefits of leaving regulation of fracking to the states? In the absence of transboundary harm, is there any justification for federal regulation of fracking.

**Question Nine.** In late May 2013 a coalition of 67 grassroots environmental groups released a letter criticizing the national environmental organization the Environmental Defense Fund (EDF) for becoming a strategic partner of a new entity called the Center for Sustainable Shale Development (CSSD). The CSSD describes itself as “unprecedented, collaborative effort of environmental organizations, philanthropic foundations, energy companies and other stakeholders committed to safe, environmentally responsible shale resource development.” The CSSD has developed 15 voluntary standards for companies engaged in fracking and it promises to certify companies who agree to follow them. Groups criticizing EDF included Greenpeace and Friends of the Earth, the Ohio Valley Environmental Coalition, and the Catskills Citizens for Clean Energy. Actors Mark Ruffalo and Debra Winger also signed the document that argued:

“The very use of the word sustainable in the name is misleading, because there is nothing sustainable about shale oil or shale gas. These are fossil fuels, and their extraction and consumption will inevitably degrade our environment and contribute to climate change. Hydraulic fracturing, the method used to extract them, will permanently remove huge quantities of water from the hydrological cycle, pollute the air, contaminate drinking water, and release high levels of methane into the atmosphere. It should be eminently clear to everyone that an economy based on fossil fuels is unsustainable.”

How would you respond to this letter? Does fracking threaten the development of renewable energy by greatly reducing the price of fossil fuels?