INTRODUCTION

Twenty years of air pollution control, costing industry and consumers billions of dollars,¹ have failed to produce desired gains in U.S. air quality. Despite an apparent and growing public concern for the environment,² attempts to reduce air pollution by regulating citizen behavior have met with outspoken hostility from the general populace.³ Does our society resist regulation of personal behavior that adversely affects the environment because we, as individuals, reject any encroachment on personal choice—even when insisting on those choices ultimately limits the freedom of all?⁴ Instead of accepting this indictment of our culture, this Comment explores the possibility that our approach to environmental regulation, with its emphasis on "rational" economic decisionmaking and technological solutions, is responsible for generating attitudes that


². Kirkpatrick, Environmentalism: The New Crusade, FORTUNE, Feb. 12, 1990, at 44 (Speech by President of the Petroleum Marketers Association of America, Nov. 1988)("The 1990's will be the decade of the environment."); see Concern Over Pollution Rises in U.S., One Poll Says, Wash. Times, Jan. 12, 1990, at A6 ("Americans foresee pollution problems worsening, and they predict improvements in this area will lag behind those for other public concerns, such as the drug epidemic, AIDS, and the federal deficit.").

³. See infra text accompanying notes 35-51.

⁴. As one commentator observed:

The freedom and ability of modern man in general and Americans in particular to exercise some rational choice over their futures is severely handicapped by a number of mutually reinforcing modern myths. . . . The most pervasive and invalid belief of all is that 'freedom' is free—that it exacts no price, that freedom exists when each individual does whatever he pleases, wherever he pleases.

prevent the individual from recognizing his or her role in causing and potentially reducing environmental degradation.

Presently, we regulate environmental contamination through the application of economic and technological criteria to environmental problems. Our regulatory philosophy, manifested in such standards as "economically feasible" and "best available technology," is to some extent a practical necessity. However, sole reliance on technologically and economically driven solutions to environmental problems may undermine the ultimate goal of reducing pollution.

First, this philosophy fosters the belief that complete reliance on technological innovation is a sufficient means of addressing environmental problems. Although technological discoveries have played a significant and valuable role in reducing human impact on the environment, their ability to resolve current and future environmental problems is speculative and inherently unreliable as an exclusive approach to environmental protection. In addition, the "technology fix" approach generates further pressure on resources by encouraging a vision of limitless material satisfaction and relegates the issue of environmental degradation to a question of technological feasibility.

Second, and more importantly, our present regulatory philosophy impedes the development of behavior-based environmental ethics—a potentially significant and accessible means of reducing pollution. Reliance on technology as opposed to changes in human behavior to solve environmental problems perpetuates the view that humans can dominate nature, rather than coexist with it. Moreover, a technology-driven regulatory system relieves individuals of responsibility for environmental degradation. This Comment suggests that the effects of this regulatory philosophy on individual behavior can be reversed through the implementation of regulations that emphasize the relationship between individuals and environmental impacts associated with their daily routines. Given the growing cost of environmental protection and the increasing


6. See L. CALDWELL, supra note 4, at 148. "Moreover, the fractionalization of the total culture as a consequence of the impact of technoscience has deprived society of general guidelines or standards by which the results or desirability of technoscientific innovation can be appraised." Id.

7. Many "environmental problems have been approached by setting scientific standards and relying on innovation to meet them, while the behavior that caused the problem continues." Bowman, The Environmental Movement: An Assessment of Ecological Politics, 5 ENVTL. AFF. 649, 663 (1976), quoted in K. SHRADER-FRECHETTE, ENVIRONMENTAL ETHICS 16 (1981).
impact of pollution on our quality of life, we can ill afford to ignore this currently available and relatively inexpensive source of pollution reduction.

This Comment uses the Clean Air Act\(^8\) to illustrate the effects of technological and economic rationalism on the development of environmental ethics. The Act is motivated by health considerations, and it touches a "right" many Americans consider fundamental—the right to breathe clean air. Implementation of the Act has resulted, however, in a conflict between legislative action and personal autonomy. Most metropolitan air quality problems are directly linked to emissions from privately owned automobiles.\(^9\) Consequently, Congress and individual states are presently confronted with the choice of imposing further technologically derived controls on air pollution sources or, alternatively, developing programs that will reduce pollution by encouraging or demanding changes in personal consumption patterns.\(^10\) The failure of the Clean Air Act to achieve its original goals illustrates the limitations of past regulatory efforts and lends support to the claim that a breakthrough in individual ethical considerations may be necessary to avert a breakdown of environmental values.

Part I of this Comment describes the moral and ethical elements Congress considered and enacted in the Clean Air Act of 1970. Part II explains how an approach to environmental regulation that focuses on economic rationality and technological dependence retards the development of environmental ethics related to individual behavior. Part III proposes a theoretical framework for the development of environmental ethics by drawing on both utility-based and biocentric perspectives. The convergence of these perspectives suggests a new direction for environmental regulation that neither offends our conception of liberty nor relegates the environment to the status of a mere instrument in the furtherance of human comfort. Part IV identifies attributes of American culture that could facilitate the development of an environmental ethics and draws upon those attributes to reinforce notions of individual freedom and encourage environmentally sensitive behavior. Part V applies this theoretical discussion to a realistic context by examining the air quality problems in the greater Los Angeles Basin.

The task of incorporating new emphases into the current regulatory structure with the aim of encouraging changes in individual behavior does not lend itself to simple solutions. However, once we recognize the counterproductive influences of current regulatory efforts and the need for individual participation in environmental solutions, it will be possible to begin formulating a coherent and functional environmental ethic as part of our regulatory strategy.

1

THE CLEAN AIR ACT: INDIVIDUAL DUTIES AND SOCIETAL COSTS

Environmental legislation has focused primarily on the reduction of pollution from industrial sources, reflecting the belief that this sector alone was responsible for the nation's environmental problems. Increasingly, however, attention has turned to the contribution of individuals to environmental contamination. In this context, automobile pollution is probably most visible. Cars are the primary cause of an environmental health threat that affects Americans in nearly every major metropolitan area. Although Congress addressed this issue in the Clean Air Act, a review of the legislation's twenty-year history suggests that Americans have been unwilling to change their behavior with respect to automobile use. As a result, many cities are now faced with the prospect of adopting stringent antipollution measures that will greatly impact the life of the average citizen.


Even in the area of auto emissions, which account for large quantities of air pollutants, the focus in pollution reduction has been to force the automobile industry to build a cleaner car and not to encourage people to drive fewer miles. See infra notes 202-203 and accompanying text.

12. In addition to air pollution, which is discussed below, efforts to change individual behavior for environmental reasons are being made in the area of solid waste disposal. Communities across the nation are passing ordinances that force individuals to separate their solid waste for recycling. See Kovacs, The Coming Era of Conservation and Industrial Utilization of Recyclable Materials, 15 Ecology L.Q. 537, 563-65 (1988).

13. See, e.g., In a Few Years, Smog Could Make Ghost Town, Chicago Trib., Nov. 15, 1988, at 6, col. 1. For a list of these metropolitan areas, see EPA, Air Programs; Approval and Promulgation of Implementation Plans; Compliance With the Statutory Provisions of Part D and Section 110 of the Clean Air Act, 53 Fed. Reg. 34,500, 34,502-07 (1988).

14. For instance, EPA is under a court order to prepare a federal implementation plan (FIP) that will bring the Los Angeles area into attainment of national air quality standards. According to EPA policy and legal interpretations, a FIP would contain extreme measures to reduce air pollution beyond those proposed in the plan designed and supported by the local air districts. See South Coast Air Quality Management District, Air Quality Management Plan: South Coast Basin 1-11 (1989) [hereinafter Plan].
A. The Clean Air Act of 1970

Congress passed the Clean Air Act of 1970\(^\text{15}\) during a time of growing public awareness of environmental issues.\(^\text{16}\) Unlike prior statutes, this Act mandated a new approach to regulation—one that limited agency discretion, forced agency action, and vested citizens with the right to sue the Environmental Protection Agency (EPA) to carry out the law as written.\(^\text{17}\) At the same time, the Act took power from the states, which had demonstrated their inability to regulate pollution, and set national standards in an attempt to protect citizen health throughout the country more effectively.\(^\text{18}\) Possibly the most novel elements of the Act, however, were the “technology forcing” provisions, that, for example, required reductions in auto emissions by 1975 that were not achievable with then-existing technology.\(^\text{19}\)

The Act required the federal government, through EPA, to set National Ambient Air Quality Standards (NAAQS) to regulate the maximum level of specific airborne pollutants.\(^\text{20}\) EPA was required to set primary standards adequate to “protect public health” and secondary standards necessary to protect the public welfare, including environmental values.\(^\text{21}\) States, however, retained regulatory authority to develop State Implementation Plans (SIP’s) which determine what emissions will be allowed from individual sources within the state.\(^\text{22}\)

This complex regulatory scheme embodies a national commitment to clean air that encompasses society’s duty to protect human and environmental health, as well as natural beauty. These ideals and values are expressed in several provisions of the Act. For example, EPA may not consider the costs of pollution reduction in determining ambient air qual-


\(^\text{17}\) See id. at 7-8.

\(^\text{18}\) See id. at 25-31.


\(^\text{20}\) CAA § 109(a), 42 U.S.C § 7409(a) (1982).

\(^\text{21}\) Id. §§ 108, 42 U.S.C. §§ 7408.

\(^\text{22}\) SIP’s were required to include “emission limitations, schedules and timetables for compliance with such limitations, and such other measures as may be necessary to insure attainment and maintenance of such primary and secondary standards, including, but not limited to, land-use and transportation controls.” Clean Air Act of 1970, Pub. L. No. 91-604, § 4(a), 84 Stat. 1676, 1680 (codified as amended at 42 U.S.C. § 7410(a)(2)(B) (1982 & Supp. V 1987)).

All proposed SIP’s are reviewed by EPA. If any plan or part thereof is deemed inadequate, and the state does not cure the inadequacy by submitting an acceptable plan, EPA must promulgate a substitute plan of its own. Id. (codified as amended at 42 U.S.C. § 7410(c)).
ity standards designed to protect human health and welfare.\textsuperscript{23} Congress also sought to ensure that all citizens would enjoy clean air, regardless of the marginal costs of providing clean air to “particularly sensitive citizens.”\textsuperscript{24} Because health risks are not well understood, Congress provided that NAAQS must include “an adequate margin of safety.”\textsuperscript{25} Thus, the law precludes cost considerations in standard setting and requires expenditures to maintain air quality necessary for the protection of human health.

In addition, the Act requires secondary standards to be set when necessary to protect “man's natural and man-made environment.”\textsuperscript{26} The Senate Report to the 1970 bill described the secondary standards as providing “for the setting of national ambient air quality goals at levels necessary to protect public health and welfare from any known or anticipated adverse effects of air pollution—including effects on soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values.”\textsuperscript{27} Visibility protection, later embodied in a fully developed program for the prevention of significant deterioration of air quality,\textsuperscript{28} reflects Congress' concern for both human health and amenity values.\textsuperscript{29} Protecting the beauty of nature, as well as man's opportunity to experience it, is thus an express goal of the Act.\textsuperscript{30}

Among the Act's most interesting provisions is the consideration of land use and transportation controls as a means of reducing pollution from mobile sources, most of which are private automobiles.\textsuperscript{31} The Senate Report recognized the importance of reducing pollution from mobile

\begin{itemize}
\item \textsuperscript{23} See, e.g., American Petroleum Inst. v. Costle, 665 F.2d 1176 (D.C. Cir. 1981), cert. denied, 455 U.S. 1034 (1982) (economic feasibility is not a relevant consideration in the promulgation of national ambient air quality standards for ozone under the CAA); Lead Indus., Inc. v. EPA, 647 F.2d 1130 (D.C. Cir.), cert. denied, 449 U.S. 1042 (1980) (statutory language of the CAA does not allow EPA to consider economic feasibility in setting air quality standards for lead).
\item \textsuperscript{24} See S. REP. No. 1196, 91st Cong., 2d Sess. 10 (1970) [hereinafter SENATE REPORT].
\item \textsuperscript{26} SENATE REPORT, supra note 24, at 11.
\item \textsuperscript{27} Id.
\item \textsuperscript{28} CAA §§ 160-169A, 42 U.S.C. §§ 7470-7491 (1982).
\item \textsuperscript{29} See id. § 169A, 42 U.S.C. § 7491. One of the most frequently stated goals of prevention of significant deterioration was the protection of visibility in national parks and designated wilderness areas where primary standards were insufficient to preserve the natural beauty of the landscape. See R. Melnick, supra note 16, at 81-83.
\item \textsuperscript{30} “Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution.” CAA § 169A(a)(1), 42 U.S.C. § 7491(a)(1) (1982); see id. § 160, 42 U.S.C. § 7470.
\end{itemize}
sources, even to the point of foregoing additional highways in favor of rapid transit systems and placing limitations on motor vehicle access to core city areas.\textsuperscript{32} By including transportation controls as an option to achieve its clean air goals, Congress warned the states that unless minimum health standards were achieved with technological controls, changes in individual behavior would be required. Technological infeasibility was not an excuse for an unsuccessful air quality program:

The Committee recognizes that during the next several years, the attainment of required ambient air quality in many of the metropolitan regions of this country will be impossible if the control of pollution from moving sources depends solely on emissions controls. \textit{The Committee does not intend that these areas be exempt from meeting the standards.} Some regions may have to establish new transportation programs and systems combined with traffic control regulations and restrictions in order to achieve ambient air quality standards for pollution agents associated with moving sources.\textsuperscript{33}

The law as originally written thus included both technological and behavioral approaches to the regulation of air pollution. It demanded from industry the greatest possible reductions in air pollution, but it also asked individuals to do their share. In recognizing the duty to protect both human well-being and environmental values, Congress authorized, albeit with little debate or public fanfare, the regulation of individual behavior as a means of meeting the Act's requirements. How is it then that so many regions have failed, some miserably, to achieve the goals set nearly twenty years ago?\textsuperscript{34} In part, the answer lies in EPA's aborted attempt to enforce transportation controls in the years following the passage of the Act.

\textbf{B. The Failure of EPA's Land Use and Transportation Controls}

It did not take long for conflict to arise between the mandate of federal law and state implementation efforts. Many proposed SIP's did not assure achievement of air quality standards.\textsuperscript{35} Indirect source review\textsuperscript{36} and transportation control plans (TCP's) were necessary, in addi-

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\footnote{\textsuperscript{32} See \textsc{Senate Report}, \textit{supra} note 24, at 2.}
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\footnote{\textsuperscript{33} \textit{Id.} at 13 (emphasis added).}
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\footnote{\textsuperscript{34} On September 7, 1988, EPA notified the governors of most of the states that their SIP's were inadequate to attain the primary NAAQS for ozone and carbon monoxide. 36 states were in nonattainment for ozone, and 32 states were in nonattainment for carbon monoxide. See EPA, \textit{supra} note 13, at 34,501. The current status designations for each area in the United States may be found at 40 C.F.R. \textsection 81 (1989).}
\addtocounter{footnote}{1}
\footnote{\textsuperscript{35} At least one commentator has argued that EPA nevertheless "bent over backwards" to approve even deficient SIP's, both before and after the 1977 amendments to the Clean Air Act. See Schoenbrod, \textit{Goals Statutes or Rules Statutes: The Case of the Clean Air Act}, 30 \textsc{UCLA L. Rev.} 740, 775-80 (1983).}
\addtocounter{footnote}{1}
\footnote{\textsuperscript{36} Indirect source review involves evaluating facilities that attract automobiles such as shopping centers, parking garages, and expressways. While not specifically mandated by the CAA, regulation of these sources was proposed by EPA as a means of reducing pollution hot}
tion to technological controls on industry, to reach the national standards on schedule. However, because state politicians refused to implement ordinances restricting use of personal automobiles, that task fell to EPA. The overburdened agency was the least likely candidate for effective implementation and enforcement of what traditionally had been in the realm of local regulation.

EPA's attempts to implement land use and transportation controls were a total failure. Pollution in major metropolitan areas was so high that air quality standards could not be met without unpopular measures such as parking bans and surcharges, mandatory bus and carpool lanes, and gasoline rationing. In addition, a host of technical and administrative problems made transportation controls "a regulatory task whose difficulties and complexity [were] virtually unparalleled." Given these obstacles, EPA needed the support of the public and local politicians who could help shape the transportation controls. Reactions from all quarters, however, were critical.

Because indirect source review does not directly address behavior of individuals, but rather seeks to affect behavior through planning, it is not addressed by this Comment. Suffice it to say that as a means of pollution control, it did nothing to further the development of environmental ethics among the general population because it primarily affected the freedom of developers.

Most scholars agree that EPA's transportation control plans failed, but there is disagreement regarding who should bear the blame. The sheer size of the problem necessitated the political support of the driving public and of officials who shaped transportation policy.

The technical problems included accurately determining the existing air quality levels in order to estimate the extent of the pollution problem, determining the necessary reduction in emissions that would produce the desired reduction in ambient pollution levels, and defining control measures that would achieve those emission reductions. The administrative problems included the unpopular nature of the required control strategies and the sheer size of the pollution problem.
The failure of EPA’s transportation control program can be attributed to the lack of public acceptance of the statutory provisions as well as to the means used by EPA in designing TCP’s.\textsuperscript{44} The manner in which the plans were adopted and the types of restrictions chosen did not foster public understanding and acceptance of the individual’s role in achieving healthful air. The Act conveyed the distinct impression that new and yet unavailable technologies would be invented and implemented to solve the nation’s air pollution problems.\textsuperscript{45} Thus, to the average citizen, coercive lifestyle restrictions would not be justified until industry reduced its contributions to air pollution.\textsuperscript{46} However, EPA moved toward regulation of personal behavior before SIP’s were even approved.\textsuperscript{47} Consequently, the timing of events suggested that the auto industry was seeking to escape its duty to build a cleaner car while EPA imposed restrictive regulations on personal freedoms.\textsuperscript{48}

More than just the timing of the program was responsible, however, for its rejection by the public. EPA applied a program designed to force people out of their cars and into public transportation.\textsuperscript{49} Regulation of this nature, however, fails to bring forward the tension between environmental duty and personal choice. Parking bans and surcharges do not emphasize the implications of choosing to drive. Instead, they simply foreclose an option for getting to work regardless of other factors and without specific explanation of the benefits to be achieved by the citizen’s sacrifice.

How might EPA have structured TCP’s differently to induce recognition and acceptance of individual responsibility for clean air? First, tailoring programs and policies to local political and environmental conditions might have led to greater public understanding and acceptance of individual responsibility for air quality improvements.\textsuperscript{50} Since conditions, lifestyles, and beliefs differ from city to city, EPA should have established a process enabling communities to consider the relative merits of different transportation controls. EPA could then have chosen among strict transportation controls because they seemed like the “handiwork of overzealous bureaucrats.” Id.

\textsuperscript{44} TCP’s by necessity had a broad scope and imposed seemingly draconian burdens on many private citizens. Moreover, since TCP’s required major shifts in transportation patterns, they presented huge enforcement problems. \textit{See id.} at 303-10, 320-21.

\textsuperscript{45} \textit{Id.} at 304.

\textsuperscript{46} \textit{See id.} at 309. For example, the transportation controls proposed by EPA for Boston included parking bans and surcharges, bus lanes, and mandatory carpooling. Reductions in air emissions from these measures were expected to be only 2.5%, much less than the needed reduction of 69%. \textit{Id.}

\textsuperscript{47} \textit{See generally id.} at 303-05.

\textsuperscript{48} \textit{Id.} at 308-10.

\textsuperscript{49} \textit{See id.} at 326.

\textsuperscript{50} Even environmentalists helped to defeat this goal by seeking to implement the Act through litigation, thereby shifting debate from the public and political realms to the courts. \textit{See generally id.} at 311-13, 320-42.
locally acceptable and effective alternatives that might have generated greater citizen support.

Second, strategies closely tailored to the source of pollution could be more effective in illustrating the connection between behavior and pollution. For example, driving restrictions during certain pollution “seasons” could apply universally and continue only during periods of unacceptable pollution levels. These “no driving days” could be enforced through restricted road access (perhaps during rush hours only), imposition of tolls based on the number of passengers in each vehicle, and strict carpool requirements. The commuter could then choose between long delays and social disapproval for driving alone or public transportation and carpooling.

These regulatory methods confront individuals with a decision about their behavior. This opportunity to choose between personal preferences and environmental necessities is instrumental to the development of environmental ethics. As one author noted:

[Value orientations about environmental matters have been rooted in historical experience, with each viewpoint enjoying importance and validity in different circumstances. . . . [Acknowledging all viewpoints] assume[s] that it is better for people to be involved in the choices—environmental or social—which face them than for those choices to be made by irrational forces of the marketplace or by an authoritarian government.51

Perhaps similar controls might have succeeded had they been reached through a process where interested parties commented on projects posing significant environmental impacts. If the public had been confronted with the relationship between clean air and consumption patterns and had participated in developing proposed solutions, it might have perceived the necessity of personal sacrifice. Instead, the public firmly rejected EPA’s regulatory attempts because the rhetoric of promised technological solutions encouraged the belief that industry should clean up first and that individuals were not responsible for the nation’s air pollution problems.

C. The Clean Air Act Amendments of 1977: The Reaffirmation of TCP’s

Despite the resounding public and political rejection of land use and transportation controls, Congress retained transportation control plans when it amended the Clean Air Act in 1977.52 The House Committee thought that the implementation of many of the plans was “impractical

within the time frame permitted under the current Act."53 The Senate Report stated that many of the plans "imposed vast economic and social costs, for relatively small improvement in the quality of the environment."54 Unfortunately, instead of providing guidance to EPA, Congress merely extended the compliance deadlines.55

The scheme that emerged in 1977 reflected a renewed commitment to technology-forcing, with a more flexible state program based on "reasonable further progress" that gave nonattainment areas ten years to comply.56 States were encouraged to meet the new deadlines with their own plans, rather than wait for the development and implementation of TCP's by EPA.57 The carrot-and-stick approach confronted states that did not submit implementation plans by July 1979 with the loss of federally appropriated funds for air pollution control, sewage treatment facilities, and highway construction.58

The deadlines for attainment have long since passed. Presently, most metropolitan areas are out of compliance with the Act, although only a select few have been sanctioned by EPA.59 Congress is frantically attempting to strike a new balance in an effort to pass legislation that will bring all areas of the nation into compliance by the year 2010.60

Current proposals to amend the Clean Air Act include technological controls on small businesses, regulation of consumer products, additional technology-forcing for mobile source emissions, and a "clean fuels" program predicated on the invention of alternative, clean-burning gasoline substitutes.61 However, very little attention is being paid to transporta-

57. See R. MELNICK, supra note 16, at 338.
59. EPA has apparently refrained from enforcing the sanction provisions of the Act in anticipation of congressional action to set new compliance deadlines. Congress, however, was unable to pass amendments to the Act in 1989.
60. See, e.g., supra note 10 and accompanying text.
61. See, e.g., H.R. 3030, 101st Cong., 1st Sess., 135 CONG. REC. H4459 (daily ed. July 27, 1989). This bill contains a provision establishing an "alternative clean fuels" program. Id. § 201(b) (proposed CAA § 212). Under this provision, not only must a percentage of mobile vehicles in the most severe nonattainment areas operate on alternative fuels such as methanol, ethanol, natural gas, electricity, reformulated gasoline, or any comparable low emission fuel, but a specified number of passenger vehicles operating on clean fuels must be sold in these areas. Id. Moreover, new buses are required to run on such clean fuels. Id.
tion control programs that cut emissions through a reduction in miles driven. In an atmosphere of technology-forcing and wand-waving it is not difficult to understand why the prospects for serious discussion of TCP's have diminished.

In contravention of the goals of the Act, subsequent legislation, implementation, and public reaction have gutted the moral components of the law and left only the technology-forcing approach to solving air pollution. TCP's are currently mandated by statute and offer an available means of substantially reducing air pollution. However, after their early failure and associated political costs, agencies responsible for implementing the Clean Air Act now seem uninterested in pursuing the potential that TCP's offer. Their disinterestedness reflects an implicit determination that requiring people to drive less is more costly (politically and economically) than investing billions of dollars in unknown technologies.

D. How Cost and Benefits Enter Into the Clean Air Act

When Congress directed EPA to develop national ambient air quality standards "requisite to protect the public health" with a "margin of safety," it opted for a health-based policy instead of one that would weigh regulatory costs and benefits in an effort to find a reasonable balance between the two. What the moral, health-based approach won in the legislature, it has lost in practice. The reality of persistent, if not worsening, air pollution reflects the inability or unwillingness of EPA and the states to impose the costs of reducing air pollution on industry and the public. Despite the health-based mandate of the Act, air quality regulation remains shrouded by an implicit cost-benefit perspective.

How exactly has cost-benefit analysis replaced the moral focus of the debate? The cost of not attaining mandated air quality standards—the cost our regulatory mechanisms have refused to place directly on individuals and industry—is borne daily by those who breathe unhealthy air, by sensitive individuals who must forego opportunities for outdoor experiences because of health risks, and by those who are unable to work due to illnesses related to air pollution. By failing to attain minimal health standards, we have implicitly asserted that these individuals, not society in general, should bear the cost of our failure to meet minimum air quality standards. By neither encouraging support for TCP's nor implementing measures that might help bring about attainment of air qual-

64. See, e.g., Lead Industries Ass'n v. EPA, 647 F.2d 1130, 1148-62 (D.C. Cir.), cert. denied, 449 U.S. 1042 (1980) (Clean Air Act designed to "protect the public health" without consideration of economic or technological feasibility).
ity goals, government regulators have balanced regulatory costs and the benefits of clean air against the backdrop of current technology.65

As a result, the average citizen has been deprived of the opportunity to make a decision that reflects ethical attitudes toward mankind and nature. If achievement of air quality goals results in job displacement, unemployment, and higher utility bills, then the decision to forego air quality in light of these costs should at least be an open process. In that fashion, the trade-offs between different values and freedoms in modern society can be faced squarely. The burdens of transportation controls might even look attractive as an option to the social costs imposed by alternative means of achieving air pollution reduction. However, by cutting off the moral inquiry at an economic threshold, government regulators prevent the individual from understanding the consequences of her behavior through a conscious process of weighing personal preferences against ethical concerns.

Given the current cost-benefit approach, however, public rejection of controls on personal behavior is understandable. With a vision of the issues dominated by economic considerations, the public rejected TCP's as improper and inconvenient. The moral issue was never presented in a manner that would encourage individuals to make a conscious, considered decision. Without the ethical element, TCP's were clearly unappealing in comparison to promised technological solutions to pollution. TCP's viewed in light of both ethical and economic concerns, however, might have struck a different chord with the American public.

The task, therefore, is to introduce regulations that present the public with an alternative vision of the relationship between economics and environmental quality. Such regulation could facilitate the development of an environmental ethic that draws on noneconomic societal values and encourages individual participation in the achievement of a cleaner, healthier environment. The development of such an ethic, however, requires an understanding of the effects of economic rationality on public policy decisions and the impact of cost-benefit analysis on the development and recognition of ethical responsibilities at the collective and individual levels.

65. Despite the tremendous costs of reducing air pollution, the costs to society of inaction are far greater. See PLAN, supra note 14, at 4-2 ("[T]he air quality benefits would significantly outweigh the estimated pollution control cost of implementing these control measures.").
II
THE EFFECT OF TECHNOLOGICAL DEPENDENCY AND ECONOMIC ANALYSIS ON ENVIRONMENTAL ETHICS

This section examines the effects of society's dependence on technology and economic analysis on the development of environmental ethics. It suggests that the predominant use of economic criteria in public policy matters emphasizes one cultural value at the expense of others. In the context of air quality management, the primacy of economic considerations frustrates the development of environmental ethics.

A. Technological Dependency

If the ultimate goal of an environmental ethic is to persuade individuals to make decisions based on a recognition and appreciation of moral duties, then the values supporting different modes of behavior must be examined. Because the "social system often generates values which motivate individuals," the existence (or absence) of ethical attitudes toward the environment depends on the underlying cultural beliefs of a society.

American cultural attitudes toward the environment have produced both exploitative and preservationist tendencies. Technological developments, for instance, have improved the quality of human life and freed individuals to pursue self-realization. The continued emphasis on developing technology (and technology alone) to solve problems associated with industrial development, however, has reinforced the individual's sense of "separateness" from the environment. The scientific method that propels technological development breaks systems down into component parts that can be studied and manipulated in isolation. When applied to environmental problems, this approach produces a "conceptual atomism" that precludes holistic approaches and prevents certain cultural values from becoming integrated into the attitudes and practices of society.

67. "It is evident that publicly acknowledged criteria for what is good, bad, tolerable, or preferable are largely functions of the total society." L. CALDWELL, supra note 4, at 148.
68. See C. MERCHANT, THE DEATH OF NATURE: WOMEN, ECOLOGY, AND THE SCIENTIFIC REVOLUTION 164 (1980). Merchant claims that the scientific approach has sanctioned the exploitation of nature by transforming the image of Earth from that of "a nurturing mother and womb of life into a source of secrets to be extracted for economic advance." Id. at 165.
69. See Callicott, Traditional American Indian and Western European Attitudes Toward Nature: An Overview, 4 ENVTL. ETHICS 293, 299 (1982) ("[A]pproaching the world through this model . . . it is possible radically to rearrange parts of the landscape without the least concern for upsetting its functional integrity and organic unity.").
One example of this atomized approach to the environment is the use of pesticides, insecticides, and herbicides. Pesticides were once heralded as the technological answer to difficulties arising from unwanted members of the biotic community. Many harms have resulted from such a constricted view of the problem and the inherently atomistic nature of the cure. Ecologically, pesticide use has created a host of problems that might have been foreseen. Pesticides often kill not only the intended "pest," but predator species as well, thereby exacerbating the pest problem. Insect immunity and tolerance have led to greater applications of toxic chemicals that subsequently find their way into local water and groundwater through agricultural runoff. As these chemicals enter the food chain they concentrate in higher life forms, leading to the slow poisoning of fish, waterfowl, and eventually humans. It is primarily the unintended side effects on humans exposed to the chemicals, both at work and in food, that have raised serious questions about the wisdom of treating the environment in such a compartmentalized manner.

The short-sightedness of pesticide use is a direct result of applying science and technology to a narrow problem without considering the health of the overall system. Isolated solutions to imbalances in nature, which are often the result of human activity in the first place, inevitably ignore the larger workings of the ecosystem.


71. See R. Van Den Bosch, supra note 70, at 5-7. The simplistic pesticide strategy "cannot possibly contain the versatile, prolific, and adaptable insects." Id. at 6.

72. For an account of various environmental disasters related to pesticides, see id. at 29-34, and Farm Bill 1990, supra note 70, at 3-4.

73. For this reason, pesticides are more accurately viewed as "biocides." See R. Van Den Bosch, supra note 70, at 23-25.

74. Id. at 25-28.


76. See Farm Bill 1990, supra note 70, at 15 (discussing pesticide risks, particularly those posed to farmers and children); R. Van Den Bosch, supra note 70, at 143 n.2.

77. For examples of pesticide side effects, see Farm Bill 1990, supra note 70, at 15 (farmers and children); R. Van Den Bosch, supra note 70, at 71-79 (farmworkers).

78. As an alternative approach, van den Bosch suggests "integrated control." R. Van Den Bosch, supra note 70, at 147-78. Integrated control is a "holistic" strategy that utilizes technical information, monitoring, cropping decisions, materials, and methods, as well as "nat-
B. Economic Analysis

The use of economic criteria in cost-benefit analysis reinforces technically-dependent attitudes because it narrows the scope of values to be considered when making choices that affect our relationship with the environment. Although the focus on values that are "calculable and predictable" is purportedly neutral, economic analysis relies on "both covert evaluative commitments and also un-spelled-out (sic) assumptions about human wants and needs." The process of economic decision-making presupposes some prior evaluation of what is a cost and what is a benefit, as well as "some method of ordering costs and benefits so that what would otherwise be incommensurable becomes commensurable." Economists have dominated regulatory policymaking in the 1980's with the language of utility-maximization and preference curves. The conceptual power of the free market and the cost-benefit yardstick now applied to all societal regulation attest to the pervasiveness of economics in policy analysis, including environmental policy. By equating the maximization of human welfare with economic efficiency, this group of thinkers has imposed a substantive value on the role of government in society. Although packaged as a withdrawal of government regulation

80. Id. at 226.
81. Id.
83. Executive Order 12,291 requires federal agencies to prepare a "Regulatory Impact Analysis" in connection with every major rule. Although carefully drafted to avoid conflict with substantive standards for agency action as mandated by the applicable legislation, the Executive Order requires the benefits of a proposed rule to be weighed against the costs. Exec. Order No. 12,291, supra note 82, § 3, at 128-30. In addition, agencies are required to submit yearly statements of "regulatory policies, goals, and objectives for the coming year and information concerning all significant regulatory actions underway or planned" to the Office of Management and Budget for review and approval. Exec. Order No. 12,498, supra note 82, § 1(a), at 323. Although both Presidents Ford and Carter issued Executive Orders requiring discussion of the economic consequences of regulation, see, e.g., Exec. Order No. 11,821, 3 C.F.R. 926 (1971-1975); Exec. Order No. 11,949, 42 Fed. Reg. 1,017 (1977); Exec. Order No. 12,044, 3 C.F.R. 152 (1979), neither went as far as President Reagan. "In particular, no other President has provided that regulatory action may not be initiated unless the benefits exceed the costs. . . ." Sunstein, Cost-Benefit Analysis and the Separation of Powers, 23 ARIZ. L. REV. 1267, 1268 (1981) (emphasis added). With respect to antipollution statutes, "Executive Order 12,291 enjoins regulators to enforce the law when, and only when, a cost-benefit test is satisfied—unless use of that test is prohibited by law." Id. at 1275.
84. See J. PETULLA, supra note 51, at 23: Ethical positions . . . are in large measure determined by group value systems, that is, the latent but real values of quasi-groups which, though unorganized, are capable of
from the public realm, the use of cost-benefit criteria has, in effect, replaced varied (and sometimes contradictory) legislative mandates with free market values.\textsuperscript{85}

In the context of environmental regulation, reliance on economic efficiency has resulted in decisions that diverge from interests fundamental to the ethical framework of society.\textsuperscript{86} Regulation of pollution is justified by the inability of the market to incorporate external costs.\textsuperscript{87} Regulation internalizes these costs so that market prices reflect the true cost of production to society.\textsuperscript{88} But, this approach assumes that the "cost" of pollution can be measured consistently and objectively.\textsuperscript{89} However, there is no reliable way to monetize society's environmental values.\textsuperscript{90}

These technological and economic approaches perceive environmental problems to be "incidental to the normal operations of the technoeconomic system."\textsuperscript{91} Believers in this approach do not question existing economic or political structures, but rather treat a clean environment as simply one economic goal to be balanced against other economic

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\textsuperscript{85} Costs and benefits, of course, cannot be weighed without some method of determining how they should be valued. . . . Wholly subjective judgments of value are thus unavoidable in the implementation of [Executive Order 12,291]; and there is no guarantee that these judgments will conform to the views expressed in the governing statute.

Sunstein, supra note 8, at 1276.

\textsuperscript{86} See J. Petulla, supra note 51, at 113-14; see also K. Arrow, Social Choice and Individual Values (1963).

\textsuperscript{87} See, e.g., A. Freeman, R. Haveman & A. Kneeese, The Economics of Environmental Policy 77-79 (1973). The premise underlying most environmental regulation is that industrial sources must do what is economically and technologically feasible to reduce emissions. This approach often determines the result whether the law specifically mandates the use of best available technology or employs some other balance of costs and benefits. For instance, although costs may not be considered in the setting of NAAQS standards under the CAA, states are permitted to consider costs and technological feasibility in formulating SIP's. 40 C.F.R. §§ 51.101(b)-(d) (1989). In addition, variances may be granted in cases of economic or technological hardship and may be made part of the SIP through the revision process. CAA § 110(a)(3)(A), 42 U.S.C. § 7410(a)(3)(A) (1982 & Supp. V 1987).

\textsuperscript{88} See, e.g., A. Freeman, R. Haveman & A. Kneeese, supra note 87, at 99-101. One economist has gone so far as to offer a mathematical formula for the internalization of externalities through pollution taxes and business incentives to utilize pollution reduction technologies. Baumol, On Taxation and the Control of Externalities, 62 AM. ECON. REV. 307, 321 (1972).

\textsuperscript{89} A. Freeman, R. Haveman & A. Kneeese, supra note 87, at 82-83.


\textsuperscript{91} Caldwell, The Public Administration of Environmental Policy, in Environmental Politics 278, 283 (S. Nagel ed. 1974).
goals, such as high employment and business profitability. In its rawest form, this position argues that "[t]o 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 satisfaction. . . . [E]nvironmental problems are economic problems." Such a decisionmaking approach cannot factor in ethical considerations except as they are translated into consumer demand through shadow pricing. While the translation of ethical values into economic demand quotients may appear value-neutral, unstated assumptions about the underlying function, structure, and purpose of the economy and political institutions lead decisionmakers to ignore values that are not based on economic considerations or that cannot be translated into dollars for the purpose of cost-benefit analysis. The shadow pricing cost-benefit decisionmaking process is a subterfuge that isolates the citizen from the effects of his own behavior. It processes environmental decisions through a system without exposing the biases, prejudices, and assumptions of that system. As aptly stated by Mark Sagoff:

Suffice it to say that [shadow pricing] confuses what people believe in and care about with what they desire and will spend money on. Suffice it to say that economists who price the opinions of others need to listen, therefore, only to their own. Suffice it to say that market analysis, when carried on in these terms, is a subversion of public debate. Economic analysis, carried on in these terms, can do nothing to reveal or clarify values other than those of economists themselves. Cost-benefit analysis does not open up the "back room" of policy making to the light of day. It only explains away the loud knocking at the door.

The first step in moving away from reliance on technology and economics and toward environmentalism "involves confronting [our] world views and understanding the constraining nature of those beliefs." However, the restricted terms of the debate have induced people to operate within certain "belief clusters" about environmentalism. These modes of thought have induced analytic paralysis and make it difficult for different conceptions of reality to challenge the vision of the present

94. Id. at 170; see supra note 90.
95. Sagoff, Do We Need A Land Use Ethic?, 3 ENVTL. ETHICS 293, 307 (1981).
98. Pollack, supra note 96, at 364.
structure and functioning of society. The fact that some environmental laws (such as the Clean Air Act) do not refer explicitly to cost-benefit trade-offs, but rather to the maximum feasible commitment of resources toward the achievement of environmental values, reflects the divergence of human utility from strict economic efficiency. Americans have expressed a desire for environmental protection despite the costs involved. This burden that we might willingly bear above and beyond the point of alleged economic efficiency, whether out of a sense of ethics, duty, or instinct, pinpoints a cultural value that transcends the purely economic calculus and fills a need that is not based on quantifiable measurements of utility. For example, "so long as we continue to believe in the principle of increase as the measure of satisfaction of our desires, we will never be satisfied and will never avoid scarcity."

Since demand for renewable environmental resources such as air and water will increase with population growth, there are only two ways to preserve environmental quality. The first is to require industry to install current technologies or develop new technologies that will satisfy demand without subjecting people and the environment to high levels of pollution. Often, however, we do not possess the technology to treat or eliminate the waste. Past experience with technology-forcing regulation indicates that long delays in developing new technologies are inevitable and, of course, there are no assurances that the desired results will be achieved. The second is to influence consumer behavior to reduce or eliminate demand for products that rely on processes that threaten the continued renewability of environmental resources. This latter approach, while not a substitute for the drive to develop cleaner, more efficient technologies, has great promise. It can effectively complement the former while emphasizing the potential contribution each individual can make to the environmental goal.

100. See supra notes 20-30 and accompanying text.
101. "Why should markets—even if we assume that they maximize 'satisfaction'—determine what we do to the environment?" Sagoff, supra note 95, at 306.
102. Opinion polls consistently confirm the strong public regard for environmental values and their willingness to make economic sacrifices in pursuit of those values. The New York Times/CBS News poll regularly asks the public if "protecting the environment is so important that requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of cost." In September 1981, 45% agreed and 42% disagreed with that plainly intemperate statement. Last June [1989], 79% agreed and only 18% disagreed. For the first time, liberals and conservatives, Democrats and Republicans, profess concern for the environment in roughly equal numbers.

103. J. Sax, MOUNTAINS WITHOUT HANDRAILS 76 (1980).
104. For example, the technology-forcing provisions of the CAA were achieved after nearly a decade of delay by the auto industry. For a good overview of motor vehicle regulation in this area, see Merson, Environmental Regulation of the Automobile, Env't Rep. (BNA) Monograph 31 (Dec. 17, 1982).
Legislation can be aimed at both technological and consumer-demand solutions to air pollution. New Jersey, for instance, has promulgated rules for the regulation of household air fresheners.\textsuperscript{105} Manufacturers are barred from producing or selling any air freshener that contains more than 50\% volatile organic substances (VOS) by weight.\textsuperscript{106} In addition, labels are required to display the percent VOS by weight of the product.\textsuperscript{107} This approach not only requires a reformulation of products to reduce air pollution but also affords the consumer an opportunity to choose between products based on their impact on air quality. In this way, the importance of the issue of air quality is conveyed to the consumer, and he is able to understand the impact of his behavior on the environment and to choose between products on the basis of factors other than price.\textsuperscript{108}

Environmentalists seeking to pierce the veil of economic efficiency with respect to environmental regulation thus are faced with a new challenge. Because the political gains of the 1970's have been increasingly undermined by an overemphasis on efficiency and reduction of costs to industry, environmentalists must articulate the moral significance of man's relationship to the environment and support the development of regulations that bring out these values.\textsuperscript{109}

106. Id. § 27-23.4.
107. Id. § 27-23.5(b). The labelling requirement applies to products with greater than five percent VOS by weight. Id.
108. One example of this can be found in California's recent regulation of deodorants and antiperspirants that use smog-forming propellants. See San Francisco Chron., Nov. 9, 1989, at A2, col. 5. Manufacturers who switched to hydrocarbon propellants after chlorofluorocarbons were banned must now seek new alternatives for their underarm products. It is likely that the law will lead to similar restrictions on spray paint, hair spray, and household cleaners. See id.

Another example, unrelated to air pollution, illustrates the use of labelling requirements as a means of bringing the consumer closer to the environmental and ethical impacts of daily behavior. In response to the continued slaughter of dolphins by both domestic and foreign tuna fleets, a consumer boycott of tuna companies was mounted and a bill was introduced in the House requiring a warning to be placed on labels of cans containing tuna that is caught by methods harmful to dolphins. See H.R. 2926, 101st Cong., 1st Sess., 135 CONG. REC. H3945 (daily ed. July 19, 1989) (introduced by Rep. Boxer of California). Faced with the specter of consumers choosing not to buy their products because of the environmental consequences of tuna fishing techniques, the three major American tuna companies agreed to only purchase tuna caught in a manner which does not threaten dolphins. See generally Conner, The Conversion of Starkist, San Francisco Chron., June 17, 1990, This World (Magazine), at 7, col. 1. The operation of the tuna canning industry was thus changed by consumers willing to make an ethical choice between the relative price of different tunas and marine mammal safety.

III

TRADITIONAL AMERICAN LIBERALISM, BIOCENTRISM, AND MORALITY

What is the moral duty of humans to the environment? Human exploitation of resources has resulted in the destruction of natural environments and endangerment of numerous plant and animal species. As a result, a growing movement of activists seeks to end the destruction by extending traditional notions of individual rights to all life forms. Other environmentalists adopt a biocentric approach to environmental ethics that views the eradication of species and the disruption of ecosystemic equilibria as inherently wrong. This biocentric land ethic, first espoused by Aldo Leopold, has often been criticized as implicating misanthropic consequences. But there is absent from the debate about rights, species, ethics, and ecosystems an understanding that a moral duty exists and should govern man's relations with the natural world. Regrettably, such a duty is not emphasized by current approaches to environmental regulation.

This section discusses why our notions of individual rights cannot serve as a cohesive basis for determining the moral relationship between humans and the environment. Then it explores recent interpretations of Leopold's land ethic, as a theory of functional interdependence, that can guide individual behavior toward nature along ethical considerations. After comparing this functional ethical structure to the framework of thinking about environmental values based on human utility, this section concludes that the debate over the proper sources of a new environmental ethic is unnecessary. Instead, theorists should build from areas of agreement and reexamine current regulatory philosophy to gain a greater understanding of its effects on the development of environmental ethics.

A. The Application of Atomistic Rights to Nature

The paradigm of traditional American liberalism has provided the language of reform for major ethical movements throughout U.S. history—whether it was the emancipation of the slaves, suffrage for women, or protection of endangered species. A claim of minority exploitation is a powerful tool for change in a society predicated on individual liber-


111. See id. at 146-60. The main difference between these "deep ecologists" and the animal liberationists is that the former think in terms of species and processes, while the latter think in terms of individual rights. Thus, deep ecologists can justify some ("necessary") killing as ethically acceptable. See id. at 147.

112. Noted animal rights supporter Tom Regan, for example, has characterized the holism of Aldo Leopold and other modern biocentric theorists as "environmental fascism." Id. at 159.

ties. It comes as no surprise then that ecologists have employed rights rhetoric in an attempt to extend moral and ethical protection to our increasingly exploited, threatened, and endangered environment.

Many of the “deep ecologists” treat environmental problems as symptomatic of the relationship between mankind and nature and call for major transformations of social values and institutions. However, their claims that animals, plants, and even rocks have a right to exist on a moral par with humans are unpopular. The ethical standards upon which they base their claims are designed to guide behavior between humans and cannot be imposed readily on the relationship of humans to the rest of the physical world without degrading the ethic or rendering it functionally meaningless. The eco-activist who tries to garner support for protection of animals undermines his cause when he equates the right of those animals to exist with the concurrent human right.

To avoid this dilemma, some have attempted to relate the degree of moral duty owed to some distinguishing factor of the species involved. The line can be drawn in many places. Do we accord mammals special rights because they are “born” and not hatched? Is the proper distinction drawn between the animal and plant worlds?

Clearly there can be no single answer, nor is there any point in pursuing one.

If the ultimate goal is to preserve the environment, either for its own sake or for human use and enjoyment, then a value-based principle must be employed to create a coherent ethical framework that can guide individual behavior. In this way, human moral sentiments can be extended to nature without employing notions of individual rights. The foundation of a new environmental ethic, therefore, must be built on an extended view of human moral obligation to other humans and a duty to preserve the functional health of the natural community in which we reside.

B. Biocentrism and the Leopoldian Land Ethic

Any discussion of biocentric ethics must begin with Aldo Leopold, originator of the “land ethic.” Leopold readily recognized the distinction between an ecological ethic that limits freedom of action in the

114. See R. NASH, supra note 110, at 161-62.
115. See id. at 4-12.
117. See, e.g., R. NASH, supra note 110, at 156-60 (discussing the debate on biocentric ethics, particularly the concept that nonhuman life has rights that humanity ought to respect).
118. For a critique of the animal rights movement and animal liberation ethics, see CALLICOT, IN DEFENSE OF THE LAND ETHIC: ESSAYS IN ENVIRONMENTAL PHILOSOPHY 15-59 (1989).
119. See generally id. at 126-46.
struggle for existence and a philosophical ethic that differentiates between social and antisocial behavior. However, according to Leopold both ethics describe the same notion, "the tendency of interdependent individuals or groups to evolve modes of co-operation."

Leopold questioned whether enlightened self-interest that extends only to obedience of law, participation in political and social processes, and economically driven resource decisionmaking could sufficiently protect the environment. He noted that relying on government to protect the environment allows the individual to live in an economically self-interested way. Since most individuals value natural resources for their utility, government intervention would be required to protect those elements of the ecology that are not economically important but are nonetheless important to the health and survival of the ecological community.

In formulating his land ethic, an alternative to the self-interested government protection model, Leopold considered both the ability of the land community to adapt to human impacts and the ability of humans to tread more lightly on the land. Whereas population densities have arguably brought great gains in human living standards, the assumption that greater density will provide similar gains ignores diminishing returns resulting from the growth of negative externalities. Individual decisionmaking must consider these externalities to formulate a plausible, rational approach to land use. According to Leopold, the private landowner must therefore consider ethics and aesthetics in decisionmaking in order to redefine the land use decision as involving more than just economic concerns.

Leopold's vision was revolutionary in nature and implication, even though the road to action encouraged by the land ethic is far from clear. He believed that "[t]he mechanism of operation is the same for any ethic: social approbation for right actions; social disapproval for wrong actions." Whereas Leopold states that the problem is "one of attitudes and implements," his evaluation falls short of an indictment of industrial

122. Id. at 218.
123. Id.
124. See id. at 223-25.
125. See id.
126. See id. at 228-29.
127. See id. at 230-36.
128. Id. at 235-36.
129. Id. at 240.
130. "[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." Id. at 229.
131. Id. at 241.
modernity. "We are remodeling the Alhambra with a steamshovel, and we are proud of our yardage. We shall hardly relinquish the shovel, which after all has many good points, but we are in need of gentler and more objective criteria for its successful use." This passage suggests an enlightened ethic, more than a dismantling of technological society.

Still the implications of Leopold's ethic are not readily evident. Leopold certainly can be read as advocating use of land in a fashion mutually beneficial to man and nature. However, some have chosen to read the land ethic maxim as an absolute replacement of anthropocentric values with "environmental values." And Leopold's discussion of population density provides ammunition for those who would accuse the land ethic of misanthropy. A more palatable interpretation views Leopold's land ethic as one "in which ecosystemic good is to be weighed along with human good in deciding the rightness or wrongness of actions." How might such interests exist side by side? One author suggests that survival interests are paramount and that in "certain circumstances it may not be wrong to destroy an ecosystem and in certain circumstances it may not be wrong not to satisfy a human interest." Thus, as a general principle, "the survival interests of human beings ought to outweigh the survival interests of the rest of the biotic community and the survival interests of the rest of the biotic community ought to outweigh the nonsurvival interests of human beings."

This approach begs the question of what constitutes a human survival interest. Some undoubtedly consider private transportation, modern refuse disposal, and sanitation to be "survival needs." Thus, a survival principle falls short of directing either governmental or individual behavior beyond the limits established under the Endangered Species Act. A larger theoretical framework and plan for action is needed to implement effectively Leopold's land ethic.

Recent extrapolations from the classical Leopoldian land ethic offer a different explanation of the moral duty to respect environmental values. Building on the science of ecology, these philosophical models of

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132. Id.
133. Id.
135. See generally R. NASH, supra note 110, at 126-60.
136. Id. at 244; see A. LEOPOLD, supra note 121, at 219 ("A land ethic . . . cannot prevent the alteration, management, and use of these resources [i.e., soil, water, plants, and animals], but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.").
137. Heffernan, supra note 134, at 246.
138. Id.
140. "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, supra note 121, at 240.
our relationship with nature offer an opportunity for the individual to reevaluate personal resource-consumption decisions by considering ethical obligations to ecosystem continuity.

Jon Moline interprets Leopold's land ethic as a theory that "applies holistic criteria not directly to acts, but only indirectly to these [acts] through criticisms of practices, rules, predilections, and attitudes."141 By acquiring "conscience" or "attitude inertia," individuals need not consider the function of an ethic on a case-by-case basis.142 Rather, the ethic guides holistic decisionmaking through the operation of habit and routine.143 In this way, the application of right or wrong (on whatever ethical basis, whether it be survival, stability, integrity, or beauty interests) need not be made in each individual case.144 As Leopold remarked, "[a]n ethic may be regarded as a mode of guidance for meeting ecological situations so new or intricate, or involving such deferred reactions, that the path of social expediency is not discernible to the average individual."145

In addition, ecological ignorance146 means that we are unable to decide, on a case-by-case basis, how rationally to apply any direct attitude toward nature—whether that attitude be one of conqueror or defender. Incomplete information makes a truly "objective" analysis of utility or economy equally impossible.147 Realizing the limits of our knowledge of the environment is the first step toward recognizing that an economic model is insufficient as a guide for ethical behavior outside the marketplace.

If, as Moline postulates, Leopold has not offered a set of rules by which ethical principles are to be practiced, what exactly does the land ethic propose? First, its criticism of utility-based rationality suggests a new model for valuing actions affecting the biotic community—the notion of ecological interdependence.148 Second, by establishing a value system based on ecological function,149 Leopold avoids the misanthropic pitfalls of directly applying ethical considerations based on anthropocentric notions of utility, sentience, pain, and benefit to the environment.150 From this value system emerges a theory of nature and a theory of rights that is not biocentric, but rather is rooted in biotic functionalism.151

142. Id. at 106.
143. Id. at 106-07.
144. Id.
145. A. LEOPOLD, supra note 121, at 218-19.
146. See Moline, supra note 141, at 107.
147. See generally Maclntyre, supra note 79.
148. Moline, supra note 141, at 113. See generally id. at 112-20.
149. See Moline, supra note 141, at 113.
150. See id. at 100-08.
151. See id. at 112-20.
Functional interdependence defines moral considerability in accord with the role an individual or species plays in maintaining the balance and integrity of the ecosystem. Because species often function in the biotic community as units (and not individuals), they receive ethical treatment on that level. While the individual animal, plant, or flower is unable to adapt to changing biological conditions so as to add to the stability and integrity of the ecosystem, species as a whole, however, function exactly in that adaptive manner. They increase their numbers to compensate for overpopulation of prey or by establishing defenses to prevent an unchecked expansion in the number of predators.

The ethical implications of a functional structure for humans becomes clearer in this context. Because each individual human has the ability to alter the ecosystem on a level that animals can only achieve through species-wide impacts, the ethical responsibilities of the individual lie on the same functional plane as that of the instinctive behavior of animal species. By the same token, because individual humans have moral considerability on par with that of a species serves as the grounds for individual humans having "a right to continuation similar to that which nonhumans have only at the species or population level."

According to this theory, humans are relieved of the responsibility of making a moral choice every time an act results in the death or use of individual animals or plants. However, the continued functioning of any and every species is a value that each individual and our society collectively must bear. In this way, our individual behavior ought to be limited as a matter of moral attitude and ethical practice. This duty extends to human actions at both individual and collective levels. The nonhuman actors, because they function on the species level and lack the capacity to make moral decisions, are not subject to criticism for failing to consider the implications of their individual acts. Each nonhuman individual, acting according to instinct, plays its part in the ecology that compensates for external changes that threaten the functional continuity of the ecosystem. As a moral actor capable of choice, however, each

152. *Id.* at 113.
153. *Id.*
154. *Id.* at 115-16.
155. *Id.* at 116-17.
156. *Id.* at 117-18.
157. *Id.* at 118.
158. *Id.*
159. *Id.*
160. See *id.* at 116. Perhaps recognition that species react to environmental factors through adjustment of their rate of population growth will lead humans to conclude that it is their individual ethical responsibility to prevent increases in present population levels.
161. Although animals usually respond to environmental factors through natural adjustments in their birth rate, humans, as moral actors capable of analysis and choice, are not limited solely to population-oriented adjustments in behavior to meet their ethical duties to the
human can not only discern the need for placing limitations on behavior, but can also act "to impose a kind of discipline on our own behavior and on that of others." 162

How does respect for functioning ecosystems translate in practice? Take the private use of personal automobiles, for example. No one individual’s use of an automobile will threaten the ecosystem’s integrity and stability. Leaving your car at home does not seem to have an appreciable effect on the local flora and fauna, acid rain, or global warming. Driving to work every day thus would not appear to involve an ethical decision.

This logic would apply to nonhuman actors, but fails as a guide for human behavior. The fact that individual actions do not significantly impact the environment does not lead to the conclusion that humans have no responsibility to the ecosystem. Individual actions have cumulative impacts that threaten the stability and integrity of ecosystems. And because we are capable of imposing discipline on our behavior, we cannot escape responsibility for individual acts that have cumulative, adverse impacts on the ecosystem. Like animal species, we must also react, either by instinct or by restrictions on behavior, to limit the effect of our species on the environment. Thus, regulation of individual behavior is the logical result of any attempt to meet our duties as a society.

Although imposing discipline on our behavior may entail simple changes in lifestyle, such as using public transportation when available, widespread compliance with this moral duty is possible. To succeed in this effort, the duty and the new perception of the environment must be clearly articulated. In addition, we must design incentives to restrain "freedoms" that are environmentally destructive. Some of these regulations already exist; the use of private property, for example, is already regulated to prohibit the filling of wetlands163 and to limit the harvesting of trees. 164 Examples of limitations on private automobile use are emerging in other nations. Downtown urban areas in Europe have banned auto use to reduce air pollution, relieve traffic congestion, and protect culturally important buildings from the corrosive effects of auto emissions. 165 The reasons for such regulation can vary, but human health,
safety, and convenience all benefit from these limits. Free use of buses in downtown areas, which has been implemented in Seattle, offers relief from the delays and fuel waste of traffic tie ups and city gridlock. Adjustments of personal behavior for health, convenience, and cultural values are only one step ahead of similar action based on identification with the environment. The task ahead is to reconcile individual behavior with the moral imperative of respect for ecosystems through regulations that are consistent with recognized and socially relevant moral values.

C. The Duality of Ethics

The notion that the environment deserves moral consideration is not inconsistent with the perception of the environment as a resource to be exploited for the satisfaction of human needs and desires. And, the existence of both selfish and altruistic tendencies in society does not preclude the development of a workable environmental ethic to guide human behavior toward mutual sustainability with nature. Indeed, an ethic that ignores either component of human nature will likely fail as a behavioral guide.

Both biocentric functionalism and utility-based approaches, although beginning from different sets of assumptions and definitions of the moral community, advocate similar ethical behavior toward the environment. The difference is in the underlying moral duty. The utility-based duty toward nature is rooted in the mutuality of self-interest and is understood in relation to human values and cultural self-image, not the inherent value of nature. This responsibility is certain to fall short of the


167. An example of the inseparability of selfish and altruistic ethical components is found in the practices of Native Americans prior to the white settlement of the New World. Much scholarly attention has been paid to the Native American land ethic, which sustained both ecological health and diversity while also supporting viable human populations. See generally Heizer, Natural Force and Native World View, in 8 HANDBOOK OF NORTH AMERICAN INDIANS: CALIFORNIA 649 (1978); Vescey, American Indian Environmental Religions, in AMERICAN INDIAN ENVIRONMENTS: ECOLOGICAL ISSUES IN NATIVE AMERICAN HISTORY 1 (C. Vescey & R. Venables eds. 1980); Callicott, supra note 69; MacLeod, Conservation Among Primitive Hunting Peoples, 43 SCI. MONTHLY 562 (1936); Martin, The European Impact on the Culture of the Northeastern Algonquian Tribe: An Ecological Interpretation, 31 WM. & MARY L. REV. 3 (1974).

American ethical attitudes toward nature also reflect a combination of ethical restraints, albeit based on a different conception of community and moral considerability. [Both the Euro-American and Native American] cultural traditions provide very different views of nature and thus very differently excite or stimulate the moral sentiments of their members. In persons belonging to both cultures there is, we may be sure, a mixture of selfishness and altruism. The ratio does not vary so much from culture to culture as from individual to individual. Callicott, supra note 69, at 317 (emphasis in original).
level of moral duty owed directly to nature under a biocentric perspective, which values nature for its intrinsic worth. However, both approaches rely on the understanding that our ability to fulfill our own stated goals and aspirations for society is interconnected with the health and stability of the natural environment.

In an extreme case, where the ecosystems upon which we depend are believed to be threatened with imminent collapse, the two perspectives may actually result in similar behavioral and ethical responses. However, to the extent that there is a gap between our perceptions of dependence on the natural environment and our understanding of the science of ecology, the utility-based approach will fall short of the biocentric approach in altering human behavior and impact on the environment.

For the purposes of this Comment and its narrower focus on air pollution regulation, it is of little importance that the resulting behavioral modifications that emerge from these two theories of our relations with nature are not identical. The difference is one of degree only. It is more important to recognize that both perspectives support the claim that a moral duty exists to act in a manner that protects certain aspects of nature. In practice, the variance in behavior modifications pursuant to this duty is likely to be greater between individuals acting according to either theory than between the theoretical perspectives themselves. The existence of a moral duty, regardless of its origins, bridges the perceived gap between man and nature that has spawned and expanded an atomized view of progress.

IV
THE EFFECT OF GOVERNMENT REGULATION ON THE DEVELOPMENT OF ENVIRONMENTAL ETHICS

If the behavior of individuals reflects the tension between selfishness and altruism, then the manner in which cultural institutions address this tension will determine to some degree ethical attitudes and behavioral tendencies toward nature. Behavior is directly determined by attitudes

168. Although this assertion may dismay those who support biotic and ecosystem rights, environmental sensitivity can be attained through appeal to both biocentrism and human self-interest. Pure biocentric theories are highly subjective and therefore defy description in a standard that is rooted in a deeper societal or cultural understanding.

169. For instance, Native American “cultures provided their members with an environmental ethical ideal, however much it may have been from time to time or from person to person avoided, ignored, violated, or for that matter grudgingly honored because of fear of punishment.” Callicott, supra note 69, at 318 (emphasis in original).

and values that set our goals and frame our conceptions of the world.\textsuperscript{171} Our conceptions of the order of nature and the proper relationship of people to that order may, in turn, have either a tempering, restraining effect on manipulative and exploitative tendencies or they may have an accelerating, exacerbating effect.\textsuperscript{172}

Even though we may recognize a moral responsibility to the environment, this value cannot simply be imposed upon the public. Changes in individual behavior can only be achieved if the notion of a responsibility to nature is incorporated into the political and regulatory institutions of society. Environmental regulators should consider, in addition to economic factors, whether a regulatory decision will enhance the ability of individuals to pursue self-actualization through the freedom to experience choice.

The difficulty of establishing a framework for the discussion and incorporation of societal values other than economic efficiency lies in the diverse nature of the American people. Whether we examine political, social, or religious practices, in a system founded on free market capitalism, none is as universal as economic enterprise. Economic analysis serves as the dominant basis of decisionmaking for practical reasons. Most individuals must face, and therefore become familiar with, decisionmaking based on economic considerations.\textsuperscript{173} Cost-benefit analysis provides a medium for debate that enables us to discuss issues and reach conclusions.\textsuperscript{174} In so doing, it moves the level of discourse one step away from the underlying assumptions, which are often in dispute, while lending an air of legitimacy to the final result.\textsuperscript{175}

\begin{itemize}
\item \textsuperscript{171} Callicott, \textit{supra} note 69 at 307.
\item \textsuperscript{172} Id. at 308.
\item \textsuperscript{173} This fact is not lost on the automobile manufacturers. A recent advertisement in a national environmental group’s magazine shows a new red car driving alongside a lake’s edge with a snow-covered mountain looming large in the background. The heading reads: “GM’s job is to make everything in this picture affordable.” The story at the bottom of the page reflects GM’s intent to divorce Americans from their responsibility to the environment by making the burden of providing both cars and clean air an issue of science, technology, and economics, not behavior:
\begin{quotation}
In the last three decades, GM has brought . . . science, technology, engineering, and marketing of fuel-efficient cars . . . to bear in behalf of the environment. To understand better the complex interrelationship between man and nature. To identify problems and propose solutions.

We believe our job is to make a healthful environment ever more affordable. \textsc{Sierra}, Nov./Dec. 1989, at 4.
\end{quotation}
\item \textsuperscript{174} “The rationale for cost-benefit studies is not only that government projects should be justified by the most economically beneficial actions, but also that a method had to be developed to establish a price for goods that are outside the market system.” J. Petulla, \textit{supra} note 51, at 79.
\item \textsuperscript{175} Economics as a decisionmaking tool is limited by its own assumptions and biases and therefore cannot properly incorporate a mixture of priorities and freedoms that are valued, but not priced, by society. \textit{See supra} text accompanying notes 94-95.
\end{itemize}
Reliance on the common denominator of economics, however, emphasizes short-term gain and slowly undermines noneconomic values.176 To the extent that these values do not overlap with an economic approach to policymaking or are not directly protected by the Constitution they are subject to extinction. In order to preserve these values, an alternative analytical structure must be derived from the varying political, religious, and social elements of society. This structure must be recognizable and embody widely-held values and beliefs.

The value that most readily unites diverse elements of American society is the freedom to experience choices in all areas of our lives. Politically, this includes, among other things, not only the decision of whether or not to vote, but also the choice of particular candidates. In the religious realm, the freedom of belief that is protected from government interference is distinct from the freedom to practice a religion. Whereas many religious beliefs exist, the value in practicing religion would be lost if the experience derived therefrom was not also protected.177

With respect to nature, freedom to experience choice is embodied in several expressions of national cultural heritage. The Wilderness Act of 1964,178 for example, sets aside pristine natural areas so that the experience of visiting these areas will remain a choice and freedom for present and future generations. Absent such legislation, development, mining, silviculture, and resource-intensive forms of recreation would eventually destroy many of these areas and eliminate the choice and the freedom to experience wilderness.179 While it may not be economically rational to set aside land with potentially valuable resources, the cultural value of preserving these experiences has, to date, prevailed.180

176. This process is evident today. During the greatest postwar economic expansion, important social issues such as homelessness, poverty, education, and the environment have been neglected due to overemphasis on considerations of economic growth.

177. One example of the undermining of noneconomic values by the choice of regulatory means is the U.S. Forest Service’s treatment of national forests. In an effort to cut trees in order to sustain the ailing lumber industry of the Pacific Northwest, some of the last remaining virgin forest lands are scheduled to be logged. In one case the Forest Service proposed to build a logging road through sacred Native American mountain territory, interfering with their ability to experience the "High Country" in the performance of “renewal ceremonies” and spiritual healing. See Note, Lyng v. Northwest Indian Cemetery Protective Association: Bulldozing First Amendment Protection of Indian Sacred Lands, 16 ECOLOGY L.Q. 515, 516-19 (1989). In that case, the important social values of diversity and freedom fell victim to the economic criterion of profitability despite their importance to the realization of the constitutional freedom of religious belief. See generally id.


179. See generally J. SAX, supra note 103, at 61-77.

In an earlier and formative period of our history, freedom of choice was embodied in westward migration and the promise of endless frontier lands. American liberalism, which "explains our national origins, delineates our ongoing mission, and anchors our ethics," developed in part through exposure to the North American frontier. Scholars have noted the dual aspects of American attitudes toward the environment, especially wilderness, that developed on the frontier. Whereas the natural state was seen as hostile and savage at first, the experience of survival and settlement gave birth to a new appreciation of engaging the natural surroundings. Having converted the wilderness into a habitable environment, some pioneers became nostalgic about the tasks they had performed and the character of the people that had developed as a result. By the close of the 19th century the experience of settling the continent had changed American attitudes toward the natural environment.

Closure of the American frontier and widespread urbanization of the majority of the population removed the frequency and urgency of engaging the natural environment. Wilderness preservation has emerged, primarily as a product of urban life. Few choose to experience the wilderness in the same manner as did their ancestors, but the cultural value in experiencing the natural environment is still evident. Whether we consider the growing demand for urban and national parks or look to the myth of the Marlboro Man, a cultural value related to the environment persists today. If most Americans never choose to engage nature through a wilderness trip, then perhaps the continuing value of a natural environment lies in the knowledge that we are able to choose that experience if we so desire. This value exists independently from the value to people who actually visit wilderness areas, or the benefit to society from the values fostered through such experiences.

Self-actualization is a value protected by the Constitutional guarantees of freedom of expression, religion, and the right to vote, but its sig-

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181. R. Nash, supra note 110, at 10.
183. See id. As the American experience supplanted prior European perspectives, religion was subsequently described as "in nature." Id. at 56 (quoting Estwick Evans).
184. Id. at 40-43.
185. Estwick Evans exemplified the reversal of American attitudes toward nature when he described the "pleasure of suffering, and the novelty of danger." Id. at 56 (emphasis in original).
186. See, e.g., Berry, Preserving Wildness, Wilderness, Spring 1987, at 39 (arguing that conservation requires durable workmanship and a spiritual appreciation of material things).
A man could be a lover and defender of the wilderness without ever in his lifetime leaving the boundaries of asphalt, powerlines, and right-angled surfaces. We need wilderness whether or not we ever set foot in it. We need a refuge even though we may never need to go there. . . . We need the possibility of escape as surely as we need hope.
significance extends beyond the protections guaranteed in the Constitution. As an environmental issue, self-actualization requires the use of renewable resources in a manner that will preserve the experience of choice for any form of individual development or social interaction. In this context, the value of clean air extends beyond one's use of that air, one's desire that others use that air, and the moral obligation to leave clean air for future users. The absence of clean air will reduce the opportunities for individuals to experience freedom of choice, whether that choice requires air for exercise, a view of the landscape, artistic endeavors, or in certain situations, the right to use a car (and thereby pollute) for personal transportation.

The infamous "plastic trees" debacle reveals how a decision based on rational economic analysis reduces opportunities for choice. In 1972, Los Angeles officials decided to install more than 900 plastic trees in concrete planters along the median strip of a major boulevard. The decision to "plant" plastic trees, based on economic criteria, was ridiculed by Los Angeles citizens who vandalized the trees and mockingly added plastic birds to the display. What was wrong with plastic trees? Live trees would probably not have survived, and if they did, they probably would have been emaciated and unattractive. In addition, plastic trees would not need irrigating and thus money could have been saved and valuable water resources conserved. According to city officials, the creation of an artificial environment and the consequent "regulation" of environmental experiences were economically feasible and therefore socially acceptable.

The decision of Los Angeles officials to opt for fake trees struck a chord in the cultural intuitions of society. Some value other than bottom-line economics resulted in the discontinuation of the plastic tree project. Plastic trees conflicted with some basic American value. It is unlikely that the objections reflected public sentiment that the road should not have been built, or that real trees had a "right" to exist on the boulevard and not to be impersonated by manmade substitutes. Nor could anyone argue persuasively that real trees were worth the price in

189. Id.
190. See id. at 1315 n.4.
191. As Professor Tribe argues,

The perpetually green lawn and the plastic tree, far from representing the outcroppings of some inexplicable human perversion, are expressions of a view of nature fully consistent with the basic assumptions of present environmental policy. These assumptions, which are implicit in developing uses of policy analysis as well as in emerging institutional structures, make all environmental judgment turn on calculations of how well human wants, discounted over time, are satisfied.

192. Id. at 1317.
The separation of urban humanity from the environment is applauded and relied upon by most individuals in American cities. But elimination of the choice to encounter nature in its natural form rather than duplicated in plastic represents a larger attack on American cultural beliefs. Precisely because we are not part of nature and do not solely upon survival instincts in leading our lives, we are capable of making choices. The decision to embark down the plastic path of artificial environments threatens our freedom to experience those choices. If stopped, the reliance on rational economic analysis to choose the kinds of experiences that are available to the public will undermine other values in society that are inconsistent with cost-benefit policymaking.

Once we recognize that any decision to regulate experiences should reflect a spectrum of values, not just economics, an alternative basis for decisionmaking begins to take shape. Options that expand opportunities for experiencing freedom of choice and self-actualization should be given weight in the balance with economic costs and benefits. In some instances, this analysis may result in behavior that is beneficial to man and society, although potentially disruptive to the natural environment. These trade-offs cannot be avoided. The equilibrium between our use of the environment and ecosystem functions will differ depending on the choices we make. Each choice will affect the availability of future choices. At any given time, different needs, competing moral imperatives, and evolving priorities will come into play. In the end, however, the preservation of choice itself represents an important cultural value that must be considered along with other competing factors. As our use of the environment begins to narrow opportunities for choice, environmental ethics should be employed to preserve experiences based in the natural world for the benefit of present and future societies.

V

LOS ANGELES—THE FRONTIER OF AIR POLLUTION CONTROL?

The problem of air pollution presents state and federal governments with an opportunity to change the way people view themselves in relation to the environment. Nowhere is this more evident than in Southern California, where the personal automobile is sacred and the resultant environmental damage is staggering. Each day the South Coast Air Ba-

193. Not only is the quality of the air affected by auto emissions, but water quality is degraded by the deposition of certain air pollutants in the form of acid rain. See generally
sin\(^{194}\) collects the exhaust from the automobiles of over eleven million residents.\(^{195}\) According to one member of the South Coast Air Quality Management District (SCAQMD) Board, the air is so polluted it "can kill plants, corrode metal, and destroy marble."\(^{196}\) The fog in Los Angeles has been measured at "battery acid level."\(^{197}\) Autopsies of fifteen to twenty-five-year-old accident victims reveal lung tissue resembling that of forty-year-old emphysemics.\(^{198}\)

Not only does Los Angeles have the worst air quality in the nation, at times exceeding some national health standards by a factor of three,\(^{199}\) but over half of that pollution is generated by personal automobiles.\(^{200}\) Thus, without major improvements in mass transit, Los Angelenos must either rethink their personal transportation priorities or hope for a technological miracle to achieve acceptable air quality.\(^{201}\)

Past efforts to control air pollution in Los Angeles, however, have not addressed the issue of individual behavior. "Nearly all control programs developed to date have relied on development and application of cleaner technology and add-on emission control devices. Only recently have efforts been directed at how emission sources are used. . . ."\(^{202}\) Despite the massive reduction in pollution emitted by new motor vehicles since the inception of the Clean Air Act (90% for some pollutants), increases in the number of vehicles and total miles driven have reduced the

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194. "The South Coast Air Basin, which comprises all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernadino counties, has the worst air quality problem in the nation." PLAN, supra note 14, at i.

195. Id. at 1-7. By the year 2010, population in the basin will rise to more than 15 million people. Vehicle miles driven are expected to increase an astonishing 68%. Id. at vi.


197. Id.

198. Id. at 33, col. 3 (citing the work of University of Southern California pathologist Dr. Russell P. Sherwin).

199. See PLAN, supra note 14, at i.

200. See id. at 3-4. In Los Angeles, mobile sources are responsible for most emissions of carbon monoxide (96%) and nitrogen oxides (72%), as well as a significant proportion of ozone-causing reactive organic gases (52%). See PLAN, supra note 14, at 3-5. Small service industries and businesses in shipping and trade have replaced large industrial sources such as steel and tire manufacturing. Id. at 1-7. Along with small-scale residential sources, these newer industries are responsible for the majority of the remaining emissions. See id. at 3-5 to 3-7. Since Los Angeles is on the West Coast, long-distance transport of air pollutants generated in other cities does not significantly contribute to pollution in Los Angeles. Moreover, heavy industry has largely fled the area, leaving no obvious scapegoats to blame for fouling the Basin's air. See id. at 1-7.

201. Given present budgetary constraints, it appears that the mass transit option may be already foreclosed. The Los Angeles County Transportation Commission has noted a $30 billion shortfall between actual funding and the cost of 270 miles of heavy and light rail, freeway improvements, and the transit fleet modifications prescribed in SCAQMD's plan to ease congestion and pollution. See L.A. Fights for Breath, supra note 196, at 33, cols. 4-5.

potential air quality benefits. Technology-forcing won the battle of inventing pollution reduction devices, but lost the war for clean air.

In 1989, an association of local governments in the South Coast Los Angeles Air Basin banded together and produced a plan that, if implemented, will nonetheless fail to bring the region into compliance with minimum NAAQS's by the year 2010. The plan, while paying lip service to the role of the citizen in reducing air pollution, relies on both existing and as yet unavailable technologies as important means of reducing air emissions. Reduction of air pollution through changes in consumer behavior, a means that is currently within our grasp simply by driving less, is treated, ironically, as speculative.

The provisions of the SCAQMD plan are projected over twenty years and are predicated on pending amendments to the current Clean Air Act that would extend compliance deadlines pursuant to adoption by the state of specific, action-forcing measures. Undoubtedly, TCP's will be included in the amended law. Thus, the Los Angeles air basin plan represents the most advanced and ambitious attempt to regulate air pollution and personal behavior. Despite this fact, the plan gives short shrift to the potential for reducing pollution through alterations in personal behavior pursuant to a regulatory strategy that encourages the development of environmental ethics.

The plan creates three tiers of emissions controls to be implemented over a five- to twenty-year period. Tier I consists of controls that can be adopted within the next five years using currently available technol-

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204. PLAN, supra note 14.

205. Id. at 1-11. To date, NAAQS's have been set for six pollutants: sulfur dioxide, lead, ozone, nitrogen oxides, carbon monoxide, and particulate matter. See 40 C.F.R. §§ 50.4-50.12 (1989).

206. The South Coast Air Quality Management District Board resolved that:

It is the obligation of all citizens, organizations, and units of government in Southern California to seek to attain the federal and state ambient air quality standards at the earliest possible date. Whenever possible, District rules shall be promulgated in a manner which establishes emission reduction objectives rather than technological prescriptions.


207. See PLAN, supra note 14, at 4-1 to 4-37; see also infra text accompanying notes 211-214.

208. See PLAN, supra note 14, at 4-19; see also infra text accompanying notes 222-232.

209. See PLAN, supra note 14, at 1-10 to 1-12. Bills currently being considered by Congress divide nonattainment areas into three categories, depending on the severity of the problem. The pollution reduction measures that will be required vary in each category. Los Angeles is in the "most serious" or "severe" category in each bill. See, e.g., H.R. 3030, 101st Cong., 1st Sess. § 103 (1989).


211. See PLAN, supra note 14, at 4-1.
Tier II contains already-demonstrated control technologies and "on the horizon" technologies that require advancements which can reasonably be expected in the near future. Tier III consists of "major technological breakthroughs to reduce emissions."

Current law requires implementation of a plan that will bring about attainment of NAAQS's within five years. EPA is presently under a court order to develop such a plan which will contain extreme measures not included in the South Coast plan. "[T]he inability of the Air Resources Board, the District, and the South Coast Association of Governments to guarantee implementation of all Tier II and Tier III measures, suggest that EPA may not be able to approve every measure included in the [plan]."

The tiered approach to technology reveals the philosophy behind the South Coast Air Quality Management Plan. The Board has essentially conceded that it will implement Tier I efforts and hope for the best. Its reliance on "major technological breakthroughs" in Tier III is clearly out of line with the purposes and goals of the Clean Air Act. Not only does it pose the environmental problem as a technological issue, but it also tells people that there is no need to change behavior because technology will change instead.

Because individual response will be shaped by the means chosen to address the problem, the plan's relative emphasis on transportation controls versus technological development is significant. Unfortunately, the plan sends an inconsistent message to Los Angelenos. On the one hand, Tier I contains a list of twenty transportation controls affecting the way people travel, commute, and work. These elements are correctly placed in Tier I, since they are currently within the technological capabilities of society. On the other hand, Tier III relies on the development of essentially emission-free "extremely low emission vehicles." The message from this approach is that there is no need to get out of your car (or even to carpool) since we will simply force Detroit to invent a car that does not pollute. The burden is then placed on auto manufacturers to create technology that will solve the mobile source air pollution problem. If the auto companies are going to invent autos that run on clean

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212. Id. at vii; see id. at 4-1 to 4-23.
213. Id. at vii-viii; see id. at 4-24 to 4-29.
214. Id. at viii; see id. at 4-30 to 4-37.
215. Id. at 1-11.
216. Id.
217. Id. at 1-11 to 1-12.
218. "In contrast to the specific measures and implementation schedule laid out in Tier I, Tiers II and III are more akin to a long-term work schedule." Id. at 6-2.
219. See supra notes 15-34 and accompanying text.
220. See PLAN, supra note 14, at 4-19 to 4-21.
221. See id. at 4-33 to 4-34.
fuel, why should people themselves invest in the transportation and land-use options outlined in Tier I?

In this light, how do the TCP measures stand up to the technology-forcing elements of the plan? Although Tier I presents programs that are implementable within five years, some of the measures outlined in the plan require “enabling legislation” or “additional funding.” Additional funding related to regional transportation problems is estimated at $44 billion over twenty years. Only $21 billion of that is expected to be available. Examples of proposed transportation control measures include alternative work schedules, telecommuting, and improved traffic flows. No steps have been taken to achieve these measures or explain how they will be implemented.

A comparison of expected emissions reductions from Tier I controls, if implemented, with those expected from Tier III's currently non-existent technologies, indicates the potential of Tier I controls to reduce pollution. Reduction of emissions from TCP's (in tons per day of each pollutant) are estimated to be 120 for reactive organic gases, 166 for nitrogen oxides, and 1343 for carbon monoxide. By comparison, Tier III reductions from extremely low-emitting vehicles, including those that do not emit at all, are 88, 90, and 1023 respectively. The gains expected from Tier III technologies are thus considerably less than those expected from Tier I's vaguely designed program of behavior adjustment and modification.

One cannot help but question whether Tier I lives up to its claims of “full implementation of known technologies.” The District’s goal of carpooling at about 1.5 persons per vehicle would significantly reduce traffic congestion, thereby reducing ozone formation. Those who doubt the capacity of 14 million people who drive 100 million miles per day, to sacrifice for the common good need only recall the outpouring of civic pride that accompanied the 1984 Los Angeles Olympics. Despite the influx of tourists, athletes, and journalists from around the globe, freeways flowed as they never do during normal days. Voluntary implementation of staggered work hours and carpooling quickly cleared the air. The San Gabriel Mountains popped into view from the city.

222. Id. at 4-19.
223. Id.
224. Id.
225. Id.
226. Id.
227. Id. at 4-34.
228. See L.A. Fights for Breath, supra note 196, at 48, col. 3.
229. Id. at 16, col. 1.
230. See id.
231. Id.
232. Id. Before the end of the Olympics, however, the unclogged freeways proved too enticing to ignore. Traffic soon exceeded earlier proportions, perhaps attracting those who
If we are serious about the values expressed in the Clean Air Act, then restrictions on transportation to achieve those values certainly rise to the level of Olympic proportions. The short-term success of the Los Angeles Olympics experience reveals a potential for civic participation that programs like the South Coast Air Quality Management Plan have failed to tap. Without abandoning attempts to reach technological solutions to air pollution sources, controls on transportation could be established to encourage or require the effort made during the Olympics on a regular basis. The task, therefore, is to frame the issues of noneconomic and culturally recognizable terms in order to reach a deeper level of commitment and understanding from the affected population.

Regulation of individual behavior, which was rejected in the 1980's atmosphere of cost-benefit considerations, can gain acceptance through linkage to culture values. An example of regulation that brings together environmental costs and personal behavior is a sliding scale toll based on the number of passengers in a vehicle. Not only would carpool lanes exist to benefit those who ride in high occupancy vehicles, but penalties would be assessed on those who refuse to contribute to the success of a transportation control plan. The plan could raise tolls dramatically during rush hours for single occupancy vehicles, leaving people free to choose that option, but punishing them for hurting efforts to clean the air. The simple economic incentive will at least remind citizens of their role in causing environmental harm. As more people participate in the program, more highway lanes can be committed to carpool use. Those who choose to ignore their ethical duties will receive appropriate societal disapproval and suffer the consequences of increasingly difficult freedom of transportation.

Each of the proposals suggested serves the dual purpose of establishing behavior patterns that incorporate ethical responsibilities toward the environment while appealing to individual self-interest. Increased freedom, whether it involves outdoor recreation in clean air or greater ease of movement on the freeways, can be understood as mutually beneficial from both selfish and altruistic ethical perspectives. Freedom of movement and environmental quality, once placed within the ethical realm, can be compatible social values served by nominally restrictive regulation.

would not normally brave the highways under regular conditions. Id. at 16, col. 2.

233. The use of economic sanctions against behavior that is discouraged by society from a moral perspective is not inconsistent with an effort to convert cost-benefit views of the environment into ethical choices. Penalties are signs of social disapproval, not attempts to tax a behavior at its true cost to society. Support for ethical sanctions can be found in the willingness of citizens to vote to raise taxes, especially when they support a value that is socially desirable (e.g., schools).
Similarly, driving regulations that are tailored to environmental quality concerns require the minimum sacrifice necessary to achieve a desired social goal. Carpooling restrictions enable participants to benefit from air quality improvements during critical pollution "seasons" and conditions while also participating in a solution that is viewed as necessary for human and environmental health.

Even simple economic incentives, such as the imposition of sliding scale tolls on heavily used roads, sends an ethical and economic message to the driver who must pollute alone in his automobile. The economic penalty, although insufficient in many cases to deter undesirable driving behavior, carries a stigma of societal disapproval. The "violator" cannot help but experience a sense of moral shame for unnecessarily polluting the air. At the same time, those who are unable or unwilling to participate can, at the very least, understand the highway exaction as a contribution to the construction and subsidization of the necessary public transportation systems that must exist as alternatives.

There are no easy solutions to public resistance to transportation controls, nor are there universally effective ideas for implementing innovative programs. But, as the Olympics proved, the ability to achieve air pollution goals, even in Los Angeles, lies within the grasp of the American people. Regulatory attempts to reach air quality attainment levels should focus on the means chosen to bring about change, with an eye toward values that are supported by the underlying culture of society. In this way, reliance on technology and dependence on scientific breakthroughs could take a back seat in the public's eye to currently achievable means of adjusting individual habits and routines along environmentally ethical lines.

Regulation of the type suggested above walks a fine line between intuitive acceptance and public ridicule. General notions of individual freedom and personal autonomy have developed without serious consideration of environmental health and values. A plea for inclusion of ethical considerations in daily American life could easily fall on deaf ears if not preceded by educational programs aimed at mobilizing public support. Public participation is necessary both for the dissemination of important information and the construction of acceptable means designed to achieve locally supported ends. People must understand the benefits of restrictive regulations and the consequences of continued "freedom" if the enthusiasm necessary for a restructuring of habits and routines is to be garnered in favor of environmental protection.

Ethical considerations, even if they carry the force of law, will not guarantee successful reduction of environmental impacts. It is one thing to recognize the interaction of law and morality and quite another to use the former to dictate the latter. Rather, a convergence of legal direction and nonlegal social pressure for change is needed to prevent legislative
enactments from being ridiculed and ignored. Individual participation in environmental solutions can be torpedoed by attempts to overreach the practical bounds of implementation. By the same token, once inroads are made into the ethical and cultural structures of society, a dynamic process is begun. Then only the limits of the imagination restrict our ability to establish a sensitivity to environmental values, which enrich our own lives and expand opportunities for future generations to surpass the quality of life and experience available today.

CONCLUSION

The development of environmental ethics is an underutilized and potentially valuable means of reducing pollution. Prior forays into the field of ethics have turned up competing theoretical formulations of man's relationship with and duties toward nature. While neither biocentrism nor utility-based views have constructively suggested a direction for energizing ethical attitudes toward the environment, both contain elements that support the existence of moral obligations owed to human and environmental communities. Translation of this moral duty into the language of American culture is an important requirement for the achievement of a functional environmental ethic.

Government regulation of pollution, however, has not taken a demand-side approach to pollution reduction. This Comment has argued that implicit in the cost-benefit approach of government regulation is an underlying set of economic values that undermine the ability of individuals to perceive the effects of their behavior on the environment. By emphasizing what is economic, and not what is desirable, values that are consistent with economic rationality have been reinforced while those that are inconsistent have been suppressed. The ability of regulation to reach and utilize the suppressed elements to bring about change depends on the interface of regulatory programs with culturally recognizable beliefs and values about our relationship with both human and natural environments.

As an example, this Comment has analyzed the Clean Air Act with a view toward its moral implications for members of society and the continued health of the environment. It has offered a few tentative conclusions about the types of adjustments in regulatory philosophy needed to limit our reliance on science and technology. The answers to these problems, however, must be found locally through a process that includes the public in the weighing and balancing of societal values. Cost-benefit analysis cannot be replaced with a panacea to problems that are unique to a given area. But, traditional and deeply-rooted notions of freedom, the rights of individuals, and respect for the beauty of nature are all powerful ideas that should be utilized in directing the evolution of American environmental values. Perhaps by bringing the issues directly
to the consumer, society can develop an awareness absent during the era of industrial scapegoating — an era that has protected the citizen from addressing the tension between demand for freedom and consumer goods and the desire for a safe and clean environment.