

## American Institutions and Ecological Ideals

Scientific and literary views of our expansionary life-style are converging.

Leo Marx

Anyone familiar with the work of the classic American writers (I am thinking of men like Cooper, Emerson, Thoreau, Melville, Whitman, and Mark Twain) is likely to have developed an interest in what we recently have learned to call ecology. One of the first things we associate with each of the writers just named is a distinctive, vividly particularized setting (or landscape) inseparable from the writer's conception of man. Partly because of the special geographic and political circumstances of American experience, and partly because they were influenced by the romantic vision of man's relations with nature, all of the writers mentioned possessed a heightened sense of place. Yet words like *place*, *landscape*, or *setting* scarcely can do justice to the significance these writers imparted to external nature in their work. They took for granted a thorough and delicate interpenetration of consciousness and environment. In fact it now seems evident that these gifted writers had begun, more than a century ago, to measure the quality of American life against something like an ecological ideal.

The ideal I have in mind, quite simply, is the maintenance of a healthy life-enhancing interaction between man and the environment. This is layman's language for the proposition that every organism, in order to avoid extinction or expulsion from its ecosystem, must conform to certain minimal requirements of that system. What makes the concept of the ecosystem difficult to grasp, admittedly, is the fact that the boundaries between systems are always

somewhat indistinct, and our technology is making them less distinct all the time. Since an ecosystem includes not only all living organisms (plants and animals) but also the inorganic (physical and chemical) components of the environment, it has become extremely difficult, in the thermonuclear age, to verify even the relatively limited autonomy of local or regional systems. If a decision taken in Moscow or Washington can effect a catastrophic change in the chemical composition of the entire biosphere, then the idea of a San Francisco, or Bay Area, or California, or even North American ecosystem loses much of its clarity and force. Similar difficulties arise when we contemplate the global rate of human population growth. All this is only to say that, on ecological grounds, the case for world government is beyond argument. Meanwhile, we have no choice but to use the nation-states as political instruments for coping with the rapid deterioration of the physical world we inhabit.

The chief question before us, then, is this: What are the prospects, given the character of America's dominant institutions, for the fulfillment of this ecological ideal? But first, what is the significance of the current "environmental crusade"? Why should we be skeptical about its efficacy? How shall we account for the curious response of the scientific community? To answer these questions I will attempt to characterize certain of our key institutions from an ecological perspective. I want to suggest the striking convergence of the scientific and the literary criticism of our national life-style. In conclusion I will suggest a few responses to the ecological crisis indicated by that scientific-literary critique.

In this country, until recently, ecological thinking has been obscured by the more popular, if limited, conservationist viewpoint. Because our government seldom accorded protection of the environment a high priority, much of the responsibility for keeping that end in view fell upon a few voluntary organizations known as the "conservation movement." From the beginning the movement attracted people with enough time and money to enjoy the outdoor life: sportsmen, naturalists (both amateur and professional), and of course property owners anxious to protect the sanctity of their rural or wilderness retreats. As a result, the conservationist cause came to be identified with the special interests of a few private citizens. It seldom, if ever, has been made to seem pertinent to the welfare of the poor, the nonwhite population, or, for that matter, the great majority of urban Americans. The environment that mattered most to conservationists was the environment beyond the city limits. Witness the names of such leading organizations as the Sierra Club, the National Wildlife Federation, the Audubon Society, and the Izaak Walton League. In the view of many conservationists nature is a world that exists apart from, and for the benefit of, mankind.

The ecological perspective is quite different. Its philosophic root is the secular idea that man (including his works—the secondary, or man-made, environment) is wholly and ineluctably embedded in the tissue of natural process. The interconnections are delicate, infinitely complex, never to be severed. If this organic (or holistic) view of nature has not been popular, it is partly because it calls into question many presuppositions of our culture. Even today an excessive interest in this idea of nature carries, as it did in Emerson's and in Jefferson's time, a strong hint of irregularity and possible subversion. (Nowadays it is associated with the antibourgeois defense of the environment expounded by the long-haired "cop-outs" of the youth movement.) Partly in order to counteract these dangerously idealistic notions, American conservationists often have made a point of seeming hardheaded, which is to say, "realistic" or practical. When their aims have been incorporated in national political programs, notably during the administrations of the two Roosevelts, the emphasis has been upon

The author is professor of English and American Studies at Amherst College, Amherst, Massachusetts. This article is based on a talk presented 29 December 1969 at the Boston meeting of the AAAS.

the efficient use of resources under the supervision of well-trained technicians (1). Whatever the achievements of such programs, as implemented by the admirable if narrowly defined work of such agencies as the National Park Service, the U.S. Forest Service, or the Soil Conservation Service, they did not raise the kinds of questions about our overall capacity for survival that are brought into view by ecology. In this sense, conservationist thought is pragmatic and meliorist in tenor, whereas ecology is, in the purest meaning of the word, radical.

The relative popularity of the conservation movement helps to explain why troubled scientists, many of whom foresaw the scope and gravity of the environmental crisis a long while ago, have had such a difficult time arousing their countrymen. As early as 1864 George Perkins Marsh, sometimes said to be the father of American ecology, warned that the earth was "fast becoming an unfit home for its noblest inhabitant," and that unless men changed their ways it would be reduced "to such a condition of impoverished productiveness, of shattered surface, of climatic excess, as to threaten the depredation, barbarism, and perhaps even extinction of the species" (2). No one was listening to Marsh in 1864, and some 80 years later, according to a distinguished naturalist who tried to convey a similar warning, most Americans still were not listening. "It is amazing," wrote Fairfield Osborn in 1948 (3, p. 194), "how far one has to travel to find a person, even among the widely informed, who is aware of the processes of mounting destruction that we are inflicting upon our life sources."

### The Environment Crusade, circa 1969

But that was 1948, and, as we all know, the situation now is wholly changed. Toward the end of the 1960's there was a sudden upsurge of public interest in the subject. The devastation of the environment and the threat of overpopulation became too obvious to be ignored. A sense of anxiety close to panic seized many people, including politicians and leaders of the communications industry. The mass media began to spread the alarm. Television gave prime coverage to a series of relatively minor yet visually sensational ecological disasters. Once again, as in the coverage of the Vietnam War, the

close-up power of the medium was demonstrated. The sight of lovely beaches covered with crude oil, hundreds of dead and dying birds trapped in the viscous stuff, had an incalculable effect upon a mass audience. After years of indifference, the press suddenly decided that the jeremiads of naturalists might be important news, and a whole new vocabulary (*environment, ecology, balance of nature, population explosion*, and so on) entered common speech. Meanwhile, the language of reputable scientists was escalating to a pitch of excitement comparable with that of the most fervent young radicals. Barry Commoner, for example, gave a widely reported speech describing the deadly pollution of California water reserves as a result of the excessive use of nitrates as fertilizer. This method of increasing agricultural productivity, he said, is so disruptive of the chemical balance of soil and water that within a generation it could poison irreparably the water supply of the whole area. The *New York Times* ran the story under the headline: "Ecologist Sees U.S. on Suicidal Course" (4). But it was the demographers and population biologists, worried about behavior even less susceptible to regulatory action, who used the most portentous rhetoric. "We must realize that unless we are extremely lucky," Paul Ehrlich told an audience in the summer of 1969, "everybody will disappear in a cloud of blue steam in 20 years" (5).

To a layman who assumes that responsible scientists choose their words with care, this kind of talk is bewildering. How seriously should he take it? He realizes, of course, that he has no way, on his own, to evaluate the factual or scientific basis for these fearful predictions. But the scientific community, to which he naturally turns, is not much help. While most scientists calmly go about their business, activists like Commoner and Ehrlich dominate the headlines. (One could cite the almost equally gloomy forecasts of Harrison Brown, George Wald, René Dubos, and a dozen other distinguished scholars.) When Anthony Lewis asked a "leading European biologist" the same question—how seriously should one take this idea of the imminent extinction of the race?—the scholar smiled, Lewis reports, and said, "I suppose we have between 35 and 100 years before the end of life on earth" (6). No—what is bewildering is the disparity between words and action,

between the all-too-credible prophecy of disaster and the response—or rather the nonresponse—of the organized scientific community. From a layman's viewpoint, the professional scientific organizations would seem to have an obligation here—where nothing less than human survival is in question—either to endorse or to correct the pronouncements of their distinguished colleagues. If a large number of scientists do indeed endorse the judgment of the more vociferous ecologists, then the inescapable question is: What are they doing about it? Why do they hesitate to use the concerted prestige and force of their profession to effect radical changes in national policy and behavior? How is it that most scientists, in the face of this awful knowledge, if indeed it is knowledge, are able to carry on business more or less as usual? One might have expected them to raise their voices, activate their professional organizations, petition the Congress, send delegations to the President, and speak out to the people and the government. Why, in short, are they not mounting a campaign of education and political action?

### Why Are Most Scientists Undisturbed?

The most plausible answer seems to be that many scientists, like many of their fellow citizens, are ready to believe that such a campaign already has begun. And if, indeed, one accepts the version of political reality disseminated by the communications industry, they are correct: the campaign *has* begun. By the summer of 1969 it had become evident that the media were preparing to give the ecological crisis the kind of saturation treatment accorded the civil rights movement in the early 1960's and the anti-Vietnam War protest after that. (Observers made this comparison from the beginning.) Much of the tone and substance of the campaign was set by the advertising business. Thus, a leading teen-age magazine, *Seventeen*, took a full-page ad in the *New York Times* to announce, beneath a picture of a handsome collegiate couple strolling meditatively through autumn leaves, "The environment crusade emphasizes the fervent concerns of the young with our nation's 'quality of life.' Their voices impel us to act now on the mushrooming problems of conservation and ecology" (7). A more skeptical voice might impel us to think about the

Madison Avenue strategists who had recognized a direct new path into the lucrative youth market. The "crusade," as they envisaged it, was to be a bland, well-mannered, clean-up campaign, conducted in the spirit of an adolescent love affair and nicely timed to deflect student attention from the disruptive political issues of the 1960's. A national survey of college students confirmed this hope. "Environment May Eclipse Vietnam as College Issue," the makers of the survey reported, and one young man's comment seemed to sum up their findings: "A lot of people are becoming disenchanted with the antiwar movement," he said. "People who are frustrated and disillusioned are starting to turn to ecology" (8). On New Year's Day 1970, the President of the United States joined the crusade. Adapting the doomsday rhetoric of the environmentalists to his own purposes, he announced that "the nineteen-seventies absolutely must be the years when America pays its debt to the past by reclaiming the purity of its air, its waters and our living environment. It is literally now or never" (9).

Under the circumstances, it is understandable that most scientists, like most other people (except for the disaffected minority of college students), have been largely unresponsive to the alarmist rhetoric of the more panicky environmentalists. The campaign to save the environment no longer seems to need their help. Not only have the media been awakened, and with them a large segment of the population, but the President himself, along with many government officials, has been enlisted in the cause. On 10 February 1970, President Nixon sent a special message to the Congress outlining a comprehensive 37-point program of action against pollution. Is it any wonder that the mood at recent meetings of conservationists has become almost cheerful—as if the movement, at long last, really had begun to move? After all, the grim forecasts of the ecologists necessarily have been couched in conditional language, thus: *If* California farmers continue their excessive use of nitrates, *then* the water supply will be irreparably poisoned. But now that the facts have been revealed, and with so much government activity in prospect, may we not assume that disaster will be averted? There is no need, therefore, to take the alarmists seriously—which is only to say that most scientists still have confidence in the capacity of our political leaders, and of

our institutions, to cope with the crisis.

But is that confidence warranted by the current "crusade"? Many observers have noted that the President's message was strong in visionary language and weak in substance. He recommended no significant increase in funds needed to implement the program. Coming from a politician with a well-known respect for strategies based on advertising and public relations, this high-sounding talk should make us wary. Is it designed to protect the environment or to assuage anxiety or to distract the antiwar movement or to provide the cohesive force necessary for national unity behind the Republican administration? How can we distinguish the illusion of activity fostered by the media—and the President—from auguries of genuine action? On this score, the frequently invoked parallel of the civil rights and the antiwar movements should give us pause. For, while each succeeded in focusing attention upon a dangerous situation, it is doubtful whether either got us very far along toward the elimination of the danger. At first each movement won spectacular victories, but now, in retrospect, they too look more like ideological than substantive gains. In many ways the situation of blacks in America is more desperate in 1970 than it was in 1960. Similarly, the war in Southeast Asia, far from having been stopped by the peace movement, now threatens to encompass other countries and to continue indefinitely. This is not to imply that the strenuous efforts to end the war or to eradicate racism have been bootless. Some day the whole picture may well look quite different; we may look back on the 1960's as the time when a generation was prepared for a vital transformation of American society.

Nevertheless, scientists would do well to contemplate the example of these recent protest movements. They would be compelled to recognize, for one thing, that, while public awareness may be indispensable for effecting changes in national policy, it hardly guarantees results. In retrospect, indeed, the whole tenor of the civil rights and antiwar campaigns now seems much too optimistic. Neither program took sufficient account of the deeply entrenched, institutionalized character of the collective behavior it aimed to change. If leaders of the campaign to save the environment were to make the same kind of error, it would not be surprising. A certain innocent trust

in the efficacy of words, propaganda, and rational persuasion always has characterized the conservation movement in this country. Besides, there is a popular notion that ecological problems are in essence technological, not political, and therefore easier to solve than the problems of racism, war, or imperialism. To indicate why this view is a mistaken one, why in fact it would be folly to discount the urgency of the environmental crisis on these grounds, I now want to consider the fitness of certain dominant American institutions for the fulfillment of the ecological ideal.

### The Dynamism of America

Seen from an ecological perspective, a salient characteristic of American society is its astonishing dynamism. Ever since the first European settlements were established on the Atlantic seaboard, our history has been one of virtually uninterrupted expansion. How many decades, if any, have there been since 1607 when this society failed to expand its population, territory, and economic power? When foreigners speak of Americanization they invariably have in mind this dynamic, expansionary, unrestrained behavior. "No sooner do you set foot upon American ground," wrote de Tocqueville, "than you are stunned by a kind of tumult; a confused clamor is heard on every side, and a thousand simultaneous voices demand the satisfaction of their social wants. Everything is in motion around you. . . ." (10). To be sure, a majority of these clamorous people were of European origin, and their most effective instrument for the transformation of the wilderness—their science and technology—was a product of Western culture. But the unspoiled terrain of North America gave European dynamism a peculiar effervescence. The seemingly unlimited natural resources and the relative absence of cultural or institutional restraints made possible what surely has been the fastest-developing, most mobile, most relentlessly innovative society in world history. By now that dynamism inheres in every aspect of our lives, from the dominant national ethos to the structure of our economic institutions down to the deportment of individuals.

The ideological counterpart to the nation's physical expansion has been its celebration of quantity. What has been valued most in American popular

culture is growth, development, size (bigness), and—by extension—change, novelty, innovation, wealth, and power. This tendency was noted a long while ago, especially by foreign travelers, but only recently have historians begun to appreciate the special contribution of Christianity to this quantitative, expansionary ethos. The crux here is the aggressive, man-centered attitude toward the environment fostered by Judeo-Christian thought: everything in nature, living or inorganic, exists to serve man. For only man can hope (by joining God) to transcend nature. According to one historian of science, Lynn White (11), the dynamic thrust of Western science and technology derives in large measure from this Christian emphasis, unique among the great world religions, upon the separation of man from nature.

But one need not endorse White's entire argument to recognize that Americans, from the beginning, found in the Bible a divine sanction for their violent assault upon the physical environment. To the Puritans of New England, the New World landscape was Satan's territory, a hideous wilderness inhabited by the unredeemed and fit chiefly for conquest. What moral precept could have served their purpose better than the Lord's injunction to be fruitful and multiply and subdue the earth and exercise dominion over every living creature? Then, too, the millennial cast of evangelical protestantism made even more dramatic the notion that this earth, and everything upon it, is an expendable support system for man's voyage to eternity. Later, as industrialization gained momentum, the emphasis shifted from the idea of nature as the devil's country to the idea of nature as commodity. When the millennial hope was secularized, and salvation was replaced by the goal of economic and social progress, it became possible to quantify the rate of human improvement. In our time this quantifying bent reached its logical end with the enshrinement of the gross national product—one all-encompassing index of the state of the union itself.

Perhaps the most striking thing about this expansionary ethos, from an ecological viewpoint, has been its capacity to supplant a whole range of commonsense notions about man's relations with nature which are recognized by some preliterate peoples and are implicit in the behavior of certain animal species. These include the ideas that natural resources are exhaustible,

that the unchecked growth of a species will eventually lead to its extinction, and that other organisms may have a claim to life worthy of respect.

### The Expansionary System

The record of American business, incomparably successful according to quantitative economic measures like the gross national product, also looks quite different when viewed from an ecological perspective. Whereas the environmental ideal I have been discussing affirms the need for each organism to observe limits set by its ecosystem, the whole thrust of industrial capitalism has been in the opposite direction: it has placed the highest premium upon ingenious methods for circumventing those limits. After comparing the treatment that various nations have accorded their respective portions of the earth, Fairfield Osborn said this of the United States (3, p. 175): "The story of our nation in the last century as regards the use of forests, grasslands, wildlife and water sources is the most violent and the most destructive in the long history of civilization." If that estimate is just, a large part of the credit must be given to an economic system unmatched in calling forth man's profit-making energies. By the same token, it is a system that does pitifully little to encourage or reward those constraints necessary for the long-term ecological well-being of society. Consider, for example, the fate of prime agricultural lands on the borders of our burgeoning cities. What happens when a landowner is offered a small fortune by a developer? What agency protects the public interest from the irretrievable loss of topsoil that requires centuries to produce? Who sees to it that housing, factories, highways, and shopping centers are situated on the far more plentiful sites where nothing edible ever will grow? The answer is that no such agencies exist, and the market principle is allowed to rule. Since World War II approximately one-fifth of California's invaluable farm land has been lost in this way. Here, as in many cases of air and water pollution, the dominant motive of our business system—private profit—leads to the violation of ecological standards.

Early in the industrial era one might reasonably have expected, as Thorstein Veblen did, that the scientific and technological professions, with their strong bent toward rationality and efficiency,

would help to control the ravaging economic appetites whetted by America's natural abundance. Veblen assumed that well-trained technicians, engineers, and scientists would be repelled by the wastefulness of the business system. He therefore looked to them for leadership in shaping alternatives to a culture obsessed with "conspicuous consumption." But, so far, that leadership has not appeared. On the contrary, this new technical elite, with its commitment to highly specialized, value-free research, has enthusiastically placed its skill in the service of business and military enterprise. This is one reason, incidentally, why today's rebellious young are unimpressed by the claim that the higher learning entails a commitment to rationality. They see our best-educated, most "rational" elite serving what strikes them as a higher irrationality. So far from providing a counterforce to the business system, the scientific and technological professions in fact have strengthened the ideology of American corporate capitalism, including its large armaments sector, by bringing to it their high-minded faith in the benign consequences of the most rapidly accelerating rate of technological innovation attainable.

But not only are we collectively committed, as a nation, to the idea of continuing growth; each subordinate unit of the society holds itself to a similar standard of success. Each state, city, village, and neighborhood; each corporation, independent merchant, and voluntary organization; each ethnic group, family, and child—each person—should, ideally speaking, strive for growth. Translated into ecological terms, this popular measure of success—becoming bigger, richer, more powerful—means gaining control over more and more of the available resources. When resources were thought to be inexhaustible, as they were thought to be throughout most of our national history, the release of these unbounded entrepreneurial energies was considered an aspect of individual liberation. And so it was, at least for large segments of the population. But today, when that assumption no longer makes sense, those energies are still being generated. It is as if a miniaturized version of the nation's expansionary ethos had been implanted in every citizen—not excluding the technicians and scientists. And when we consider the extremes to which the specialization of function has been carried in the sci-

ences, each expert working his own minuscule sector of the knowledge industry, it is easier to account for the unresponsiveness of the scientific community to the urgent warnings of alarmed ecologists. If most scientists and engineers seem not to be listening, much less acting, it is because these highly skilled men are so busy doing what every good American is supposed to do.

On the other hand, it is not surprising that a clever novelist like Norman Mailer (12), or a popular interpreter of science like Rachel Carson (13), or an imaginative medical researcher like Alan Gregg (14) each found it illuminating in recent years to compare the unchecked growth of American society, with all the resulting disorder, to the haphazard spread of cancer cells in a living organism. There is nothing new, of course, about the analogy between the social order and the human body; the conceit has a long history in literature. Since the early 1960's, however, Mailer has been invoking the more specific idea of America as a carcinogenic environment. Like any good poetic figure, this one has a basis in fact. Not only does it call to mind the radioactive matter we have deposited in the earth and the sea, or the work of such allegedly cancer-producing enterprises as the tobacco and automobile industries, or the effects of some of the new drugs administered by doctors in recent years, but, even more subtly, it reminds us of the parallel between cancer and our expansionary national ethos, which, like a powerful ideological hormone, stimulates the reckless, uncontrolled growth of each cell in the social organism.

In the interests of historical accuracy and comprehensiveness, needless to say, all of these sweeping generalizations would have to be extensively qualified. The record is rich in accounts of determined, troubled Americans who have criticized and actively resisted the nation's expansionary abandon. A large part of our governmental apparatus was created in order to keep these acquisitive, self-aggrandizing energies within tolerable limits. And of course the full story would acknowledge the obvious benefits, especially the individual freedom and prosperity, many Americans owe to the very dynamism that now threatens our survival. But in this brief compass my aim is to emphasize that conception of man's relation to nature which, so far as we can trace its consequences, issued in the *dominant* forms of national behavior. And that

is a largely one-sided story. It is a story, moreover, to which our classic American writers, to their inestimable credit, have borne eloquent witness. If there is a single native institution which has consistently criticized American life from a vantage like that of ecology, it is the institution of letters.

### America's Pastoral Literature

A notable fact about imaginative literature in America, when viewed from an ecological perspective, is the number of our most admired works written in obedience to a pastoral impulse (15). By "pastoral impulse" I mean the urge, in the face of society's increasing power and complexity, to retreat in the direction of nature. The most obvious form taken by this withdrawal from the world of established institutions is a movement in space. The writer or narrator describes, or a character enacts, a move away from a relatively sophisticated to a simpler, more "natural" environment. Whether this new setting is an unspoiled wilderness, like Cooper's forests and plains, Melville's remote Pacific, Faulkner's Big Woods, or Hemingway's Africa, or whether it is as tame as Emerson's New England village common, Thoreau's Walden Pond, or Robert Frost's pasture, its significance derives from the plain fact that it is "closer" to nature: it is a landscape that bears fewer marks of human intervention.

This symbolic action, which reenacts the initial transit of Europeans to North America, may be understood in several ways, and no one of them can do it justice. To begin with, there is an undeniable element of escapism about this familiar, perhaps universal, desire to get away from the imperatives of a complicated social life. No one has conveyed this feeling with greater economy or simplicity than Robert Frost in the first line of his poem "Directive": "Back out of all this now too much for us." Needless to say, if our literary pastoralism lent expression only to this escapist impulse, we would be compelled to call it self-indulgent, puerile, or regressive.

But fortunately this is not the case. In most American pastorals the movement toward nature also may be understood as a serious criticism, explicit or implied, of the established social order. It calls into question a society dominated by a mechanistic system of value, keyed to perfecting the routine means

of existence, yet oblivious to its meaning and purpose. We recall Thoreau's description, early in *Walden*, of the lives of quiet desperation led by his Concord neighbors, or the first pages of Melville's *Moby-Dick*, with Ishmael's account of his moods of suicidal depression as he contemplates the meaningless work required of the inhabitants of Manhattan Island. At one time this critical attitude toward the workaday life was commonly dismissed as aristocratic or elitist. We said that it could speak only for a leisure class for whom deprivation was no problem. But today, in a society with the technological capacity to supply everyone with an adequate standard of living, that objection has lost most of its force. The necessary conditions for giving a decent livelihood to every citizen no longer include harder work, increased productivity, or endless technological innovation. But of course such an egalitarian economic program would entail a more equitable distribution of wealth, and the substitution of economic sufficiency for the goal of an endlessly "rising" standard of living. The mere fact that such possibilities exist explains why our literary pastorals, which blur distinctions between the economic, moral, and esthetic flaws of society, now seem more cogent. In the 19th century, many pastoralists, like today's radical ecologists, saw the system as potentially destructive in its innermost essence. Their dominant figure for industrial society, with its patent confusion about ends and means, was the social machine. Our economy is the kind of system, said Thoreau, where men become the tools of their tools.

Of course, there is nothing particularly American about this pessimistic literary response to industrialism. Since the romantic movement it has been a dominant theme of all Western literature. Most gifted writers have expended a large share of their energy in an effort to discover—or, more precisely, to imagine—alternatives to the way of life that emerged with the industrial revolution. The difference is that in Europe there was a range of other possible lifestyles which had no counterpart in this country. There were enclaves of pre-industrial culture (provincial, esthetic, religious, aristocratic) which retained their vitality long after the bourgeois revolutions, and there also was a new, revolutionary, urban working class. This difference, along with the presence in America of a vast, rich, unspoiled landscape, helps to explain the excep-

tionally strong hold of the pastoral motive upon the native imagination. If our writers conceived of life from something like an ecological perspective, it is largely because of their heightened sensitivity to the unspoiled environment, and man's relation to it, as the basis for an alternative to the established social order.

What, then, can we learn about possible alternatives from our pastoral literature? The difficulty here lies in the improbability which surrounds the affirmative content of the pastoral retreat. In the typical American fable the high point of the withdrawal toward nature is an idyllic interlude which gains a large measure of its significance from the sharp contrast with the everyday, "real," world. This is an evanescent moment of peace and contentment when the writer (or narrator, or protagonist) enjoys a sense of integration with the surrounding environment that approaches ecstatic fulfillment. It is often a kind of visionary experience, couched in a language of such intense, extreme, even mystical feeling that it is difficult for many readers (though not, significantly, for adherents of today's youth culture) to take it seriously. But it is important to keep in view some of the reasons for this literary extravagance. In a commercial, optimistic, self-satisfied culture, it was not easy for writers to make an alternate mode of experience credible. Their problem was to endow an ideal vision—some would call it utopian—with enough sensual authenticity to carry readers beyond the usual, conventionally accepted limits of commonsense reality. Nevertheless, the pastoral interlude, rightly understood, does have a bearing upon the choices open to a postindustrial society. It must be taken, not as representing a program to be copied, but as a symbolic action which embodies values, attitudes, modes of thought and feeling alternative to those which characterize the dynamic, expansionary life-style of modern America.

The focus of our literary pastoralism, accordingly, is upon a contrast between two environments representing virtually all aspects of man's relation to nature. In place of the aggressive thrust of 19th-century capitalism, the pastoral interlude exemplifies a far more restrained, accommodating kind of behavior. The chief goal is not, as Alexander Hamilton argued it was, to enhance the nation's corporate wealth and power; rather it is the Jeffersonian

"pursuit of happiness." In economic terms, then, pastoralism entails a distinction between a commitment to unending growth and the concept of material sufficiency. The aim of the pastoral economy is *enough*—enough production and consumption to insure a decent quality of life. Jefferson's dislike of industrialization was based on this standard; he was bent on the subordination of quantitative to qualitative "standards of living."

From a psychological viewpoint, the pastoral retreat affirmed the possibility of maintaining man's mental equilibrium by renewed emphasis upon his inner needs. The psychic equivalent of the balance of nature (in effect the balance of *human* nature) is a more or less equal capacity to cope with external and internal sources of anxiety. In a less-developed landscape, according to these fables, behavior can be more free, spontaneous, authentic—in a word, more natural. The natural in psychic experience refers to activities of mind which are inborn or somehow primary. Whether we call them intuitive, unconscious, or preconscious, the significant fact is that they do not have to be learned or deliberately acquired. By contrast, then, the expansionary society is figured forth as dangerously imbalanced on the side of those rational faculties conducive to the manipulation of the physical environment. We think of Melville's Ahab, in whom the specialization of function induces a peculiar kind of power-obsessed, if technically competent, mentality. "My means are sane," he says, "my motive and my object mad."

This suspicion of the technical, highly trained intellect comports with the emphasis in our pastoral literature upon those aspects of life that are common to all men. Whereas the industrial society encourages and rewards the habit of mind which analyzes, separates, categorizes, and makes distinctions, the felicity enjoyed during the pastoral interlude is a tacit tribute to the opposite habit. This kind of pleasure derives from the connection-making, analogizing, poetic imagination—one that aspires to a unified conception of reality. At the highest or metaphysical level of abstraction, then, romantic pastoralism is holistic. During the more intense pastoral interludes, an awareness of the entire environment, extending to the outer reaches of the cosmos, affects the perception of each separate thing, idea, event. In place of the technologically efficient but limited concept of nature

as a body of discrete manipulatable objects, our pastoral literature presents an organic conception of man's relation to his environment.

### A Convergence of Insights

What I am trying to suggest is the striking convergence of the literary and the ecological views of America's dominant institutions. Our literature contains a deep intuition of the gathering environmental crisis and its causes. To be sure, the matter-of-fact idiom of scientific ecology may not be poetic or inspiring. Instead of conveying Wordsworthian impulses from the vernal wood, it reports the rate at which monoxide poisoning is killing the trees. Nevertheless, the findings of ecologists confirm the indictment of the self-aggrandizing way of life that our leading writers have been building up for almost two centuries. In essence it is an indictment of the destructive, power-oriented uses to which we put scientific and technological knowledge. The philosophic source of this dangerous behavior is an arrogant conception of man, and above all of human consciousness, as wholly unique—as an entity distinct from, and potentially independent of, the rest of nature.

As for the alternative implied by the pastoral retreat, it also anticipates certain insights of ecology. Throughout this body of imaginative writing, the turn toward nature is represented as a means of gaining access to governing values, meanings, and purposes. In the past, to be sure, many readers found the escapist, sentimental overtones of this motive embarrassing. As a teacher, I can testify that, until recently, many pragmatically inclined students were put off by the obscurely metaphysical, occultish notions surrounding the idea of harmony with nature. It lacked specificity. But now all that is changing. The current environmental crisis has in a sense put a literal, factual, often quantifiable base under this poetic idea. Nature as a transmitter of signals and a dictator of choices now is present to us in the quite literal sense that the imbalance of an ecosystem, when scientifically understood, defines certain precise limits to human behavior. We are told, for example, that if we continue contaminating Lake Michigan at the present rate, the lake will be "dead" in roughly 10 years. Shall we save the lake or continue allowing the cities and industries which pollute it to reduce



expenses and increase profits? As such choices become more frequent, man's relations with nature will in effect be seen to set the limits of various economic, social, and political practices. And the concept of harmonious relations between man and the physical environment, instead of seeming to be a vague projection of human wishes, must come to be respected as a necessary, realistic, limiting goal. This convergence of literary and scientific insight reinforces the naturalistic idea that man, to paraphrase Melville, must eventually lower his conceit of attainable felicity, locating it not in power or transcendence but in a prior need to sustain life itself.

### A Proposal and Some Conclusions

Assuming that this sketch of America's dominant institutions as seen from a pastoral-ecological vantage is not grossly inaccurate, what inferences can we draw from it? What bearing does it have upon our current effort to cope with the deterioration of the environment? What special significance does it have for concerned scientists and technologists? I shall draw several conclusions, beginning with a specific recommendation for action by the American Association for the Advancement of Science.

First, then, let me propose that the Association establish a panel of the best qualified scientists, representing as many as possible of the disciplines involved, to serve as a national review board for ecological information. This board would take the responsibility for locating and defining the crucial problems (presumably it would recruit special task forces for specific assignments) and make public recommendations whenever feasible. To be sure, some scientists will be doing a similar job for the government, but, if an informed electorate is to evaluate the government's program, it must have an independent source of knowledge. One probable objection is that scientists often disagree, and feel reluctant to disagree in public. But is this a healthy condition for a democracy? Perhaps the time has come to lift the dangerous veil of omniscience from the world of science and technology. If the experts cannot agree, let them issue minority reports. If our survival is at stake, we should be allowed to know what the problems and the choices are. The point here is not that we laymen look to sci-

entists for *the* answer, or that we expect them to save us. But we do ask for their active involvement in solving problems about which they are the best-informed citizens. Not only should such a topflight panel of scientists be set up on a national basis, but—perhaps more important—similar committees should be set up to help make the best scientific judgment available to the citizens of every state, city, and local community.

But there will also be those who object on the ground that an organization as august as the American Association for the Advancement of Science must not be drawn into politics. The answer, of course, is that American scientists and technologists are now and have always been involved in politics. A profession whose members place their services at the disposal of the government, the military, and the private corporations can hardly claim immunity now. Scientific and technological knowledge unavoidably is used for political purposes. But it also is a national resource. The real question in a democratic society, therefore, is whether that knowledge can be made as available to ordinary voters as it is to those, like the Department of Defense or General Electric, who can most easily buy it. If scientists are worried about becoming partisans, then their best defense is to speak with their own disinterested public voice. To allow the burden of alerting and educating the people to fall upon a few volunteers is a scandal. Scientists, as represented by their professional organizations, have a responsibility to make sure that their skills are used to fulfill as well as to violate the ecological ideal. And who knows? If things get bad enough, the scientific community may take steps to discourage its members from serving the violators.

There is another, perhaps more compelling, reason why scientists and technologists, as an organized professional group, must become more actively involved. It was scientists, after all, who first sounded the alarm. What action we take as a society *and how quickly we take it* depend in large measure upon the credibility of the alarmists. Who is to say, if organized science does not, which alarms we should take seriously? What group has anything like the competence of scientists and technologists to evaluate the evidence? Or, to put it negatively, what group can do more, by mere complacency and inaction, to insure an inadequate response to the environmental crisis?

It is a well-known fact that Americans hold the scientific profession in the highest esteem. So long as most scientists go about their business as usual, so long as they seem unperturbed by the urgent appeals of their own colleagues, it is likely that most laymen, including our political representatives, will remain skeptical.

The arguments for the more active involvement of the scientific community in public debate illustrate the all-encompassing and essentially political character of the environmental crisis. If the literary-ecological perspective affords an accurate view, we must eventually take into account the deep-seated, institutional causes of our distress. No cosmetic program, no clean-up-the-landscape activity, no degree of protection for the wilderness, no antipollution laws can be more than the merest beginning. Of course such measures are worthwhile, but in undertaking them we should acknowledge their superficiality. The devastation of the environment is at bottom a result of the kind of society we have built and the kind of people we are. It follows, therefore, that environmentalists should join forces, wherever common aims can be found, with other groups concerned to change basic institutions. To arrest the deterioration of the environment it will be necessary to control many of the same forces which have prevented us from ending the war in Indochina or giving justice to black Americans. In other words, it will be necessary for ecologists to determine where the destructive power of our society lies and how to cope with it. Knowledge of that kind, needless to say, is political. But then it seems obvious, on reflection, that the study of human ecology will be incomplete until it incorporates a sophisticated mode of political analysis.

Meanwhile, it would be folly, given the character of American institutions, to discount the urgency of our situation either on the ground that technology will provide the solutions or on the ground that countermeasures are proposed. We cannot rely on technology because the essential problem is not technological. It inheres in all of the ways in which this dynamic society generates and uses its power. It calls into question the controlling purposes of all the major institutions which actually determine the nation's impact upon the environment: the great business corporations, the military establishment, the universities, the scientific and technological elites, and the ex-

hilarating expansionary ethos by which we all live. Throughout our brief history, a passion for personal and collective aggrandizement has been the American way. One can only guess at the extent to which forebodings of ecological doom have contributed to the revulsion that so many intelligent young people feel these days for the idea of "success" as a kind of limitless ingestion. In any case, most of the talk about the environmental crisis that turns on the word *pollution*, as if we face a cosmic-scale problem of sanitation,

is grossly misleading. What confronts us is an extreme imbalance between society's hunger—the rapidly growing sum of human wants—and the limited capacities of the earth.

#### References and Notes

1. S. P. Hays, *Conservation and the Gospel of Efficiency* (Harvard Univ. Press, Cambridge, Mass., 1959).
2. *Man and Nature*, David Lowenthal, Ed. (Harvard Univ. Press, Cambridge, Mass., 1965), p. 43.
3. F. Osborn, *Our Plundered Planet* (Little, Brown, Boston, 1948).
4. *New York Times* (19 Nov. 1969).
5. *Ibid.* (6 Aug. 1969).
6. *Ibid.* (15 Dec. 1969).

7. *Ibid.* (5 Dec. 1969).
8. *Ibid.* (30 Nov. 1969).
9. *Ibid.* (2 Jan. 1969).
10. A. de Tocqueville, *Democracy in America*, Phillips Bradley, Ed. (Knopf, New York, new ed., 1946), vol. 1, p. 249.
11. L. White, Jr., *Science* **155**, 1203 (1967).
12. N. Mailer, *Cannibals and Christians* (Dial, New York, 1966).
13. R. Carson, *Silent Spring* (Houghton Mifflin, Boston, 1962).
14. A. Gregg, *Science* **121**, 681 (1955).
15. L. Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (Oxford Univ. Press, New York, 1964).
16. For comment and criticism I thank my Amherst colleagues L. Brower, B. DeMott, J. Epstein, R. Fink, A. Guttman, W. Hexter, G. Kateb, R. Snellgrove, W. Taubman, and J. W. Ward; I also thank W. Berthoff, D. Lowenthal, J. Marx, B. McKie, and N. Podhoretz.

#### NEWS AND COMMENT

## Academic Research: OST Aide Sees No Shift in Financial Situation

A candid and gloomy analysis of prospects in federal support for academic research was publicly presented last week by the staff man who handles basic science affairs in the White House Office of Science and Technology (OST). Included in it was what is apparently the first public revelation of an OST decision to regard 6 percent in federal funds as an acceptable annual growth rate—5 percent of which would be to compensate for inflation. (A 15 percent annual growth is the figure routinely specified in recent years by many research administrators as the minimum necessary for maintaining present efforts and accommodating newcomers to the ranks of research.) Not precluded within the 6 percent figure, and, in fact, clearly foreseen, is the likelihood of actual declines in certain fields, particularly in the physical sciences. All in all, the analysis, delivered by Carl York, OST's technical assistant for basic science, stands out as the most discouraging financial forecast recently delivered to the scientific community. York did not indicate whether his observations are to be regarded as official or personal, but, in either case, he is in a position to speak knowledgeably, and his remarks merit careful notice, particularly since the administration's budget for the coming fiscal year will be finally settled during the next few weeks.

York spoke at a Washington press conference held by the American In-

stitute of Physics to offer a preview of several papers on science finance and manpower scheduled for delivery at the American Physical Society meeting that opened 23 November in New Orleans.

"Barring another 'sputnik-like surprise' as in the late 50's," he said, "no single act will swerve the present administration from a policy of a balanced budget. If then, the physical sciences in the universities must look for essentially no dollar increases and an effective inflationary decrease in their funding, the possibilities which are available to us for a solution of the problems of financing Academic Science are very restricted.

"With these boundary conditions firmly in mind, a course of action has been chosen. Industrial firms have long been faced with the problem of funding and justifying the funding of their research effort against a background of a fluctuating market. Many of them have developed what is known as a 'level-of-effort' to fix the amount of support for their basic research endeavors. . . . The percentage happens to be around 6 percent, although no one seems to know exactly where this number came from." York went on to state that it has been proposed that federal research expenditures be linked to the gross national product. However, he added, because of various difficulties in doing this, the President's science adviser Lee DuBridge [since

retired] proposed the following solution:

"He suggested that . . . in 1968 Academic Science in the United States was very strong, but it had already suffered some effective cutbacks by a decrease in appropriations from the preceding year. And so, in terms of the federal budget, that year should be taken as a benchmark to begin making policy. He then pointed out that approximately 5 percent per year would account for the inflationary trends in the economy and finally that the academic enterprise needed some room for growth. Under the pressure of the boundary conditions . . . he accepted as a minimum rate of growth an additional 1 percent per year. . . .

"The policy proposal which DuBridge has suggested, based on the level of effort concept, was that in making up the federal budget an analysis of [what] was done agency by agency . . . would be performed." If appropriations for a given agency fell below what was deemed minimal desirable growth, the agency "would be encouraged" to seek a compensating amount in the following budget. "This feedback process would greatly stabilize the overall funding available to colleges and universities," York continued, "and would in fact help enormously with their planning. The usual system of free enterprise which entrepreneurs love so much would be maintained. If the administration wished to increase its efforts in the area of urban housing, then HUD [the Department of Housing and Urban Development] would be encouraged to increase its budget for the universities.

"The problem here for the physical scientist is perfectly clear. His demands on the federal dollar must be so much more compelling than those of his colleagues that he can beat the social