
The Land Ethic Today

J. Baird Callicott

Aldo Leopold's life work centered on a single concern: conservation. In this connection, it might be worth noting that *A Sand County Almanac's* capstone essay, 'The land ethic' evolved from an earlier essay entitled 'The conservation ethic.' And, certainly, Leopold proposed a land ethic specifically to serve conservation goals. Today, however, conservation philosophy and its ecological underpinnings are in a state of transition. Organicism is out of fashion in ecology; ecologists now rally round a more individualistic paradigm, and stress change over stasis. And sustainable development is currently the bandwagon of conservation. A question thus arises: Can the land ethic serve as the moral touchstone of conservation philosophy and policy today, or is it a relic of a conservation philosophy that is rapidly obsolescing? To put this question in context, let me begin with a review of the major historical currents of thought in American conservation.

Ralph Waldo Emerson and Henry David Thoreau were the first notable American thinkers to insist, a century and a half ago, that wild nature might serve "higher" human spiritual values as well as supply raw materials for meeting our more mundane physical needs. Nature can be a temple, Emerson enthused, in which to draw near and to commune with God (or the Oversoul).¹ Too much civilized refinement, Thoreau argued, can over-ripen the human spirit; just as too little can coarsen it. "In wildness," he wrote, "is the preservation of the world."²

Building on the nature philosophy of Emerson and Thoreau, John Muir spearheaded a national, morally charged campaign for public appreciation and preservation of wilderness. People going to forest groves, mountain scenery, and meandering streams for religious transcendence, aesthetic contemplation, and healing rest and relaxation put these resources to a higher and better use, in Muir's opinion, than did the lumber jacks,

miners, shepherds, and cowboys who went to the same places in pursuit of the Almighty Dollar.³

Critics today, as formerly, may find an undemocratic and unAmerican presumption lurking in the Romantic-Transcendental conservation philosophy of Emerson, Thoreau, and Muir. To suggest that some of the human satisfactions that nature affords are morally superior to others may only reflect aristocratic biases and class privilege.

At the turn of the century, Gifford Pinchot, a younger contemporary of John Muir, formulated a novel conservation philosophy that reflected the general tenets of the Progressive era in American history. Notoriously, the country's vast biological capital had been plundered and squandered, for the benefit not of all its citizens, but for the profit of a few. Pinchot crystalized a populist, democratic conservation ethic in a credo – "the greatest good of the greatest number for the longest time" – that echoed John Stuart Mill's famous Utilitarian maxim, "the greatest happiness for the greatest number."⁴ He bluntly reduced Emerson's "Nature" (with a capital "N") to "natural resources." Indeed, Pinchot insisted that "there are just two things on this material earth – people and natural resources."⁵ He even equated conservation with the systematic exploitation of natural resources. "The first great fact about conservation," Pinchot noted, "is that it stands for *development*" – with the proviso that resource development be scientific and thus efficient.⁶ For those who might take the term "conservation" at face value and suppose that it meant saving natural resources for future use, Pinchot was quick to point out their error: "There has been a fundamental misconception," he wrote, "that conservation means nothing but the husbanding of resources for future generations. There could be no more serious mistake."⁷ And it was none other than Gifford Pinchot who first characterized the Muirian contingent of nature lovers as

aiming to “lock up” resources in the National Parks and other wilderness reserves.⁸

The famous Schism in the traditional American conservation movement thus was rent. Muir and Pinchot, once friends and allies, quarreled and each followed his separate path. Pinchot appropriated the term “conservation” for his utilitarian philosophy of scientific resource development. And Muir and his exponents came to be called “preservationists.”⁹

Aldo Leopold is the third giant in twentieth-century American conservation philosophy. At the Yale Forest School, founded with the help of the Pinchot family fortune, Leopold was steeped in what historian Samuel Hays called “the gospel of efficiency” – the scientific exploitation of natural resources, for the satisfaction of the broadest possible spectrum of human interests, over the longest time.¹⁰ And for fifteen years Leopold worked for the Forest Service, whose first Chief was Pinchot himself. Leopold’s ultimately successful struggle for a system of wilderness reserves in the national forests was consciously molded to the doctrine of highest use, and his new science of game management essentially amounted to the direct transference of the principles of forestry from a standing crop of large plants to a standing crop of large animals.¹¹ But Leopold gradually came to the conclusion that Pinchot’s utilitarian conservation philosophy was inadequate because it was not well informed by the new kid on the scientific block, ecology.¹²

As Leopold put it:

Ecology is a new fusion point for all the sciences. . . . The emergence of ecology has placed the economic biologist in a peculiar dilemma: with one hand he points out the accumulated findings of his search for utility, or lack of utility, in this or that species; with the other he lifts the veil from a biota so complex, so conditioned by interwoven cooperations and competitions, that no man can say where utility begins or ends.¹³

Conservation, Leopold came to realize, must aim at something larger and more comprehensive than a maximum sustained flow of desirable products (like lumber and game) and experiences (like sport hunting and fishing, wilderness travel, and solitude) garnered from an impassive nature. It must take care to ensure the continued function of natural processes and the integrity of natural systems. For it is upon these, ultimately, that human resources and human well-being depend, for the present generation as well as for those to come. Indeed, Leopold quietly transformed the

concept of conservation from its pre-ecological to its present deep ecological sense – from conservation understood as the wise use of natural resources to conservation understood as the maintenance of biological diversity and ecological integrity.

The word “preserve” in the summary moral maxim of Leopold’s famous land ethic – “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.” – is unfortunate because it seems to ally Leopold with the Preservationists in the familiar Preservation vs. Conservation feud.¹⁴ We tend to think of Leopold as having begun his career in the Conservationist camp and then gradually having come over, armed with new ecological arguments, to the Preservationist camp. Leopold appears, in other words, to be a mid-twentieth century conservation prophet emerging from the woods wearing the hat of Gifford Pinchot and speaking with the voice of John Muir. His historical association with the wilderness movement cements this impression.

In the 1920s Leopold had campaigned hard to preserve a few relics of the American frontier in which he and like-minded sportsmen might play at being pioneers. Later he suggested that the designated wilderness areas he had helped to create might serve conservation as biotic refugia and places where natural ecosystems could go on functioning, undisturbed by resource development.

In 1967, wilderness was defined by an Act of the United States Congress as

in contrast to those areas where man and his own works dominate the landscape, an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.¹⁵

But the preservation of wilderness, so understood, assumes a pre-Darwinian religious and metaphysical separation of *Homo sapiens* from the rest of nature. After Darwin, we cannot suppose that “man” is anything but a precocious primate, a denizen of “the earth” and a member of its “community of life.” “His own works,” therefore, are as natural as those of termites or beavers.

Biological conservation via wilderness preservation is also vitiated by ethnocentrism. To suggest that, prior to being “discovered” only half a millennium ago by the European subspecies of *Homo sapiens*, any landscape in North or South America was “untrammelled by man,

where man himself is a visitor," implies either that large portions of North and South America were uninhabited or that the aboriginal inhabitants of the New World had no significant intentional or even unintentional effect upon their lands. Or, worse, it could imply that American Indians were not truly human, were not "man."

But, by 1492, all of North and South America were fully if not densely populated.¹⁶ And the effects of more than 10,000 years of human inhabitation of the Western hemisphere have been profound and, upon the eve of European encroachment, were ongoing.¹⁷ After the arrival of *Homo sapiens* in the Western hemisphere, some 10,000 or more years ago, the only large land area fitting Congress's description of wilderness was Antarctica (and now a good bit of that continent, and the atmosphere above it, have been thoroughly trampled). As the 1988 Yellowstone fires dramatically demonstrated, when an area's aboriginal human inhabitants are removed, in order to create a wilderness, the ecologic conditions that existed at the time of their removal, presumably the conditions to be preserved in their "virgin" state, are put at jeopardy.¹⁸

Biological conservation via wilderness preservation thus proves to be based upon an incoherent idea, the wilderness idea.

While I would be the first to agree that wilderness areas are vitally important biotic refugia, the unfortunate – and unintended – legacy of Leopold's life-long association with the wilderness movement, for the American conservation policy debate, has been to intensify the familiar alternative: either efficiently exploit the remaining and dwindling wild lands or lock them up and preserve them forever as wildernesses. But a review of his unpublished papers and published but long-forgotten articles – now conveniently collected in the new book of his essays that Susan L. Flader and I have edited for the University of Wisconsin Press – shows that Leopold was from first to last committed to active land management, not passive preservation. His vision went beyond the *either* develop and necessarily destroy *or* lock up and preserve dilemma of modern conservation. Leopold was primarily concerned, on the ground as well as in theory, with integrating an optimal mix of wildness with human habitation and economic exploitation of land.

In a typescript composed shortly after a four-month trip to Germany in 1925 – and ironically, but revealingly, entitled "Wilderness" – Leopold wrote,

To an American conservationist, one of the most insistent impressions received from travel in Germany is the lack of wildness in the German Landscape. Forests are there Game is there Streams and lakes are there But yet, to the critical eye there is something lacking I did not hope to find in Germany anything resembling the great "wilderness areas" which we dream about and talk about, and sometimes briefly set aside, in our National Forests and Parks I speak rather of a certain quality [– wildness –] which should be, but is not found in the ordinary landscape of producing forests and inhabited farms.¹⁹

In a more fully developed essay entitled "The farmer as a conservationist" Leopold regales his reader with a rustic idyll in which the wild and domesticated floral and faunal denizens of a Wisconsin farmscape are feathered into one another to create a harmonious whole. In addition to cash and the usual supply of vegetables and meat, lumber and fuel wood, Leopold's envisioned farmstead affords its farm family venison, quail and other small game, and a variety of fruit and nuts from its woodlot, wetlands, and fallow fields; and its pond and stream yield pan-fish and trout. It also affords intangibles – songbirds, wild flowers, the hoot of owls, the bugle of cranes, and intellectual adventures aplenty in natural history. To obtain this bounty, the farm family must do more than permanently set aside acreage, fence woodlots, and leave wetlands undrained. They must sow food and cover patches, plant trees, stock the stream and pond, and generally thoughtfully conceive and skillfully execute scores of other modifications, large and small, of the biota that they inhabit.²⁰

Further, Leopold explicitly states the Preservationist heresy that human economic activity may not only co-exist with healthy ecosystems, but that it may actually enhance them: "When land does well for its owner, and the owner does well by his land; when both end up better by reason of their partnership, we have conservation. When one or the other grows poorer, we do not."²¹

Like Pinchot, Leopold attempted to distill his own philosophy of conservation into a quotable definition. And indeed it is often quoted, but little analyzed or appreciated: "Conservation is a state of harmony between men and land."²² This definition represents a genuine third alternative to Pinchot's brazenly anthropocentric, utilitarian definition of conservation as efficient exploitation of "resources" and Muir's anti-anthropocentric definition of conservation as saving innocent "Nature" from inherently destructive human economic development.

Can we generalize Leopold's vision of an ecologically well integrated family farm to an ecologically well integrated technological society? Can we harmonize our perfectly natural human economic activities with the equally natural economic activities of other wild species to achieve at least a peaceful coexistence and ideally a mutually beneficial symbiosis? Can we achieve, in other words, "win-win" rather than "zero-sum" solutions to development-environment conflicts? Can we design "sustainable economies" rather than zone the planet into ever-expanding sectors of conventional, destructive development and ever-shrinking wilderness sanctuaries? Can we succeed as a global technological society in enriching the environment as we enrich ourselves?

I think we can. Perhaps we cannot. More to the point, however, I think we have to try. The pressure of growing human numbers and rapid development, especially in the Third World, bodes ill for a global conservation strategy focused primarily on "wilderness" preservation and the establishment of nature reserves. Such a strategy represents a holding action at best and a losing proposition at last.

It will take more than distancing the Leopold land ethic from conservation-via-wilderness-preservation, however, to rescue it from the suspicion that it may be obsolete. Whether a "natural" area has been long inhabited and significantly affected by *Homo sapiens* or not, over time it will nevertheless change. The fourth dimension of ecosystems has recently been emphasized by Daniel Botkin.²³ Nature is dynamic, change at every frequency – diurnal, meteorological, seasonal, successional, climatic, evolutionary, geological, astronomical – is inevitable. According to Botkin, the concept of succession in ecology culminating in a climax community which will perpetuate itself generation after generation until reset by wind, fire, chain saw, plow, or some other disturbance is suspect. While accounting for change, the concept of succession-to-climax, he argues, posits, like Aristotle's theory of motion, rest or a static state as the "natural" condition of ecosystems.

Presenting a more specific and subtle challenge to the classic rationales for biological conservation, change in the structure of biotic communities has been recently documented. According to Michael Soulé,

... shifts in scientific fashion will facilitate the transition between the traditional view of biogeographic integrity and the postmodern acceptance of cosmopolitanization The acceptance of the "individualistic" paradigm of community composition, . . . which

posits that collections of species that exist in a particular place is a matter of historical accident and species-specific, autecological requirements . . . is reinforced by analyses of Holocene distributions of contemporary species. These studies are undermining typological concepts of community composition, structure, dynamics, and organization by showing that existing species once constituted quite different groupings or "communities". . . .²⁴

Finally, conservationists used to argue for biological conservation on the grounds that biodiversity was believed to be a necessary condition of stability. The diversity-stability hypothesis, however, has been severely criticized – how decisively, I am not competent to judge.²⁵ But the mandate for the conservation of biodiversity will be put at risk to the extent that its mainstay rationale is suspect.

These recent developments – the impeachment of the diversity-stability hypothesis, the diminishing credibility of the Clementsian holistic paradigm and the corresponding ascendancy of the Gleasonian individualistic paradigm in theoretical ecology, the impeachment of the community succession-to-climax model and even the typological community, and the emphasis, in general, on change rather than continuity (a kind of neo-catastrophism, as it were, supplanting uniformitarianism) – in addition to the evaporation of the wilderness idea, all give aid and comfort to the foes of biological conservation. If species in communities can mix and match as they always have to form novel associations; if diversity is not necessarily necessary to stability; if, for more than 10,000 years, there have been no large-scale, pristine, untouched terrestrial wilderness environments (outside Antarctica); if change is a fundamental feature of nature; and, most fundamentally, if man is a part of nature and anthropogenic changes are as natural as any other; then how can anyone express more than a personal subjective value in declaring any change whatever that human beings may impose on landscapes to be bad? What's wrong, objectively wrong, with urban sprawl, oil slicks, global warming, or, for that matter, abrupt, massive, anthropogenic species extinction – other than that these things offend the quaint tastes of a few natural antiquarians? Most people prefer shopping malls and dog tracks to wetlands and old growth forests. Why shouldn't their tastes prevail in a free market and democratic polity? Kristin Shrader-Frechette has explicitly brought us to this omega point:

Ecosystems regularly change and regularly eliminate species. How would one . . . argue that humans should not modify eco-

systems or even wipe out species, for example, when nature does this itself through natural disasters, such as volcanic eruptions and climate changes like those that destroyed the dinosaurs? . . . One cannot obviously claim that it is wrong on *ecological grounds* for humans to do what nature does – wipe out species.²⁶

Has Leopold and the land ethic anything of moment to say in the current climate of ecological opinion and the cynicism, so candidly expressed by Shrader-Frechette, to which it seems to lead? Yes, I think so. In ‘The land ethic,’ Leopold writes,

A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land. Health is the capacity of the land for self renewal. Conservation is our effort to understand and preserve this capacity.²⁷

Sure, change is natural, human beings are a part of nature, and anthropogenic changes are no different from other natural changes. But, quite irrespective of the vagaries of taste, we may still argue that some changes are bad and others good, *if* we can specify objective norms of ecologic health against which we may evaluate human modifications of the landscape. By the same criteria of course we might evaluate the changes wrought by any other species. Leopold remained committed to active land management, however much he may have rethought its ends. Indeed, the last years of his life were preoccupied by an unpopular effort to reduce the Wisconsin deer herd, which had, during the 1940s, become grossly overpopulated.²⁸ The difference between his eventual approach to land management and the prevailing Pinchot approach is that Leopold’s primary management goal was to restore ecosystems to robust health and maintain them in that condition, while Pinchot’s, as noted, was to exploit and convert them efficiently.

The concept of ecosystem or land health is metaphorical. “Health” in the literal, non-figurative sense characterizes only a state or condition of an organism. To employ the concept of land health metaphorically does not commit one to an implicit endorsement of F. E. Clements’s classic, but increasingly unfashionable, organismic paradigm in ecology. To insist that it would be to suppose that the concept of ecosystem health were intended to have a literal rather than metaphorical sense – the health *sensu stricto* of a super-organism. I do not think that that is what Leopold meant to imply.

Plato provides a notable historical precedent for using the concept of health metaphorically. In the *Republic*, Socrates says, “Then virtue is the health and beauty and well-being of the soul, and vice the disease and weakness and deformity of the same.”²⁹

Plato also provides an instructive historical precedent for why one would want to employ the health metaphor rhetorically. Socrates next asks whether or not a person would prefer to live in accordance with virtue or its opposite, the fundamental question of the whole dialogue. And Glaucon replies,

In my judgment, Socrates, the question now becomes ridiculous. We know that, when the bodily constitution is gone, life is no longer endurable . . . ; and shall we be told that when the very essence of the vital principle is undermined and corrupted, life is still worth having to a man . . . ?³⁰

The concept of health, in both its literal and figurative senses, is at once descriptive and prescriptive, objective and normative. Health, literally, is an objective condition of an organism capable of more or less precise empirical description. But it is also a universally valued condition, an indisputably valuable state: Except under the most unusual circumstances, no one had rather be sick than well. Similarly, Plato assumes, no one would prefer to be in a sick condition of soul or, extending the same metaphor, live in a dysfunctional body politic. Today, presumably, no one would prefer to be a citizen of a sick biotic community or, worse, be singled out as the pathologic agent of its maladies. As we see, then, if the health metaphor may, in a given context, be plausibly and persuasively employed, then the fact/value or is/ought dichotomy that has routinely plagued policy debates and applied science can be obviated.

It may be objected that health is quite evidently not a universally valued condition. People are constantly doing unhealthy things – smoking cigarettes, taking drugs, consuming too much alcohol, eating fatty food, etc. That fact however is not evidence *against* the proposition that health is universally valued; it is, rather, evidence *for* the proposition that other things are also valued – the immediate gratification that some of us get from smoking cigarettes, taking drugs, drinking too much alcohol, eating fatty food, etc. An environmental policy aimed at achieving land health faces problems analogous to a social policy aimed at improving the health of the citizenry. People must be encouraged to

compare goods and ask themselves which they value most. Personal and ecosystem health, in my opinion, is arguably a greater good than immediately gratifying our craving for smoke, coke, booze, and ice cream, and more shopping malls, dog tracks, and golf courses.

At this point, however, the problem we face in the environmental arena remains at a more fundamental stage than in the analogous social arena. While we have fairly recently managed to articulate a clear social goal of improving the health of the citizenry and mount public campaigns to dissuade people from consuming tobacco, drugs, alcohol, and fat, we have so far not managed to articulate equally clear environmental goals. If the concept of ecosystem health turns out to be plausible and persuasive and if the norms and indices of ecosystem health can be specified, then the cause of biological conservation may be significantly advanced. Then we can start to address the problem of *akrasia*.

During the last decade of his life, 1938–1948, Leopold frequently employed the concept of land health in many essays that did not find their way into *A Sand County Almanac*. In two such papers from this period, Leopold provides a sustained discussion of the concept.

Ironically, in view of the foregoing remarks, the first is ‘Wilderness as a land laboratory,’ in which Leopold offers a novel argument for wilderness preservation. Here he suggests that wilderness may serve as “a base-datum for land-health” and defines “land health” as nature’s capacity for “self-renewal,” a definition that, as we have seen, is immortalized in *Sand County*, and one that he would reiterate in subsequent discussions. Importantly, it is a definition that carries both dynamic and functional rather than static and structural connotations.³¹ Though not invoking Clements’s organismic ecological paradigm in any strict or specific sense, Leopold here, as he will elsewhere, closely associates the concept of “land health” with an organic image of nature:

There are two organisms in which the unconscious automatic processes of self-renewal have been supplemented by conscious interference and control. One of these is man himself (medicine and public health) and the other is land (agriculture and conservation).³²

That Leopold introduces the concept of land health, not as a casual rhetorical device, but as a serious scientific project, is suggested by the way he explores the analogy that he here draws to medicine. In the field of medicine, the symptoms of disease are manifest and

doctoring is an ancient art, but medical science is relatively young and still incomplete. Analogously, “the art of land doctoring is being practiced with vigor,” he comments, “but the science of land health is a job for the future.”³³

In 1941, ecology was not capable of specifying the norms of land health. On the other hand, the “symptoms” of “land-sickness” were all too evident to the discerning conservationist. Among such symptoms, Leopold mentions soil erosion and loss of fertility, hydrologic abnormalities, and the occasional irruptions of some species and the mysterious local extinctions of others.³⁴

While he argues that the most perfect “base-datum of normality” is wilderness, Leopold does not argue that the only way for land to stay healthy is to stay in an untrammelled condition. One may find places “where land physiology remains largely normal despite centuries of human occupation.”³⁵ Such a place he believed the well watered regions of Europe to be. Indeed, the practical *raison d’être* for a science of land health is precisely to determine the ecologic parameters within which land may be humanly occupied without making it dysfunctional, just as the whole point – or at least the only point that Leopold makes in this paper – of wilderness preservation is to provide a land laboratory in which such a science might be explored.

Leopold’s other sustained discussion of “land health” is found in an (until now) unpublished 1944 report, ‘Conservation: In whole or in part?’ In it, he defines conservation as “a state of health in the land” and land health, once again, “as a state of vigorous self-renewal.”³⁶ Here Leopold expressly draws out the functional connotation of this definition:

Such collective functioning of interdependent parts for the maintenance of the whole is characteristic of an organism. In this sense land is an organism, and conservation deals with its functional integrity, or health.³⁷

The maintenance of land health therefore is not necessarily the same thing as maintenance of existing community structures with their historical complement of species. Exotics may immigrate on their own or be deliberately introduced (cautiously) and evaluated, not xenophobically, but on the basis of their impact on the functional integrity of the host community. They may be pathologic; they may be benign; or, conceivably, they may actually enhance ecosystem functions.

In 'Conservation: In whole or in part?' Leopold affirms the importance of diversity for ecologic function. Referring to the post-glacial upper Midwest he writes, "The net trend of the original community was thus toward more and more diversity of native forms, and more and more complex relations between them."³⁸ He then draws the classic, but presently impugned, connection between diversity and stability: "Stability or health was associated with, and was perhaps caused by this diversity and complexity."³⁹ It is a tribute to Leopold's scientific sensibilities that he carefully avoids stating dogmatically that stability was caused by diversity. Indeed, he registers an express caveat: "To assert a causal relation would imply that we understand the mechanism . . ." But, absent thorough understanding, he argues that

The circumstantial evidence is that stability and diversity in the native community were associated for 20,000 years, and presumably depended on each other. Both now are partly lost, presumably because the original community has been partly lost and greatly altered. Presumably, the greater the losses and alterations, the greater the risks of impairments and disorganizations.⁴⁰

As the science of land health is, for Leopold in the 1940s, only envisioned, only programmatic, he suggests that the art of land doctoring can only proceed on such circumstantial evidence and err on the side of caution. The "'rule of thumb'" for "ecological conservation" then should be, he thinks, that "the land should retain as much of its original membership as is compatible with human land-use [and] should be modified as gently and as little as possible."⁴¹ But, again, it does not take a well-developed science of land health to notice the symptoms of land illness. In addition to those already mentioned in his earlier paper, Leopold here adds the qualitative deterioration in farm and forest products, the outbreak of pests and disease epidemics, and boom and bust wildlife population cycles.

Further to a governing philosophy of ecological conservation, Leopold suggests something similar to what is known today as holistic and preventive, as opposed to reductive and invasive, medicine:

This difference between gentle and restrained, as compared with violent and unrestrained, modification of the land is the difference between organic and mustard-plaster therapeutics in the field of land-health.⁴²

Leopold then goes on to outline a unified and holistic

conservation strategy, as the title of his paper would indicate.

The contemporary ecologist looking for substantive norms of ecosystem health which might serve as objective criteria for the evaluation of human modifications of historical ecologic conditions will find a review of Leopold's remarks about land health unrewarding. Leopold's scientific scruples preempted any impulse he may have had speculatively to detail them in the absence of basic ecological research. In general, he closely associates land health with both integrity, which he seems to understand primarily structurally, and stability. Leopold equates the integrity of land with the continuity of stable communities over long periods of time. Such integrity and stability, he cautiously suggests, depends upon species diversity and the complexity of relations between native species. In short, we find in Leopold only today's conventional environmental wisdom, which then was new and fresh, but is now a bit tired and tarnished.

On the other hand, Leopold's general definition of land health as the capacity for self-renewal is more functional than structural, dynamic than static. Notice, further, that all the symptoms of land illness that he notes are failures of ecologic function. Leopold bought into the wilderness myth. Indeed, he was one of the most outspoken advocates of wilderness preservation and one of the architects of the North American wilderness movement. Nevertheless, unlike a Muir or a Murie, he devoted himself primarily to the conservation of humanly occupied and used ecosystems – "a more important and complex task," as he put it.⁴³ And Leopold certainly acknowledged that long and densely populated and heavily used land could be healthy. In 'A biotic view of land,' he writes,

Western Europe, for example, carries a far different pyramid than Caesar found there. Some large animals are lost; many new plants and animals are introduced, some of which escape as pests; the remaining natives are greatly changed in distribution and abundance. Yet the soil is still fertile, the waters flow normally, the new structure seems to function and persist.⁴⁴

Susan L. Flader observes that during the 1930s Leopold underwent a fairly sudden and dramatic shift of attitude toward land management.⁴⁵ In *Game Management*, he had set out a reductive, Cartesian method of identifying and manipulating "factors" affecting wildlife populations (such as food, cover, and predation). Soon after its publication in 1933, he began

to advocate a more holistic, organic approach that was in tune with his simultaneous shift in management goals – from maximizing populations of consumable species to restoring and maintaining land health. Eugene C. Hargrove compares his new attitude to “therapeutic nihilism” in medicine.⁴⁶ This nineteenth-century school of medicine frankly acknowledged that doctors then did not know enough about the physiology of the human organism to be confident that any medical manipulation, invasion, or prescription would do more good than harm. So, they argued, doctors should err on the side of caution, do nothing, and hope their patients would recover on their own. Leopold, similarly, believed that the contemporaneous state of ecological knowledge was so incomplete that any humanly imposed changes on land were altogether unpredictable. Hence, he counselled caution and argued that the functioning of ecosystems could best be assured by preserving their historic structural integrity.

Conservation biologists are just now coming to grips with the problem of setting out objective criteria of ecologic health in dynamic, long-humanized landscapes.⁴⁷ As a philosopher, I shall not presume to tread on their technical turf. However, I can summarize here what appear to be emerging as the principal norms of land health. Ecosystem health may be evaluated by reference to the following criteria:

(1) *Biological productivity*. How much biomass is a given landscape producing per unit? Would one or another treatment increase or reduce its productivity?

(2) *Local species diversity*. How many species inhabit a given landscape?; in what numbers? Would one or another modification increase or reduce species diversity?

(3) *Global species diversity*. How many native, unique, or endemic species inhabit a given landscape?; in what numbers? Would one or another modification protect or replace more sensitive native species with weedy exotics?; or protect or threaten a given landscape’s endemics?; would it increase or reduce their populations?

(4) *Genetic variability within populations*. Genetic variability is vital to the capacity of populations to rebound from diseases and parasites and to withstand other environmental stresses. Also vital to a population’s future is to have sufficient genetic variability to evolve in response to changing environmental conditions.

(5) *Ecological function*. How well are the plant communities of a given landscape holding soil and retaining

moisture?; how well are they fixing nitrogen?; how effective are its pollinators in assisting plant reproduction?; its soil microbes in digesting detritus and cycling nutrients?; how many trophic layers exist in it?; how tangled and redundant are its trophic pathways? Would one or another modification improve or impair any or several of these functions? And these are just a few of the important ecological functions that might serve as criteria of land health that we could employ to assess whether or not a given human project was or was not consistent with biological conservation.

The new idea in conservation today is called “sustainable development.” But that term can mean different things to different people. Under one, essentially economic interpretation, it means little more than what it says, initiation of human economic activity that can be sustained indefinitely, quite irrespective of whether or not such development is ecologically salubrious.⁴⁸ Worse still, some economists would denominate a development path “sustainable” even if it leaves subsequent generations a depauperate natural environment, but sufficient technological know-how and investment capital to invent and manufacture an ersatz world.⁴⁹ By “sustainable development” I would like to mean initiation of human economic activity that is limited by ecological exigencies; economic activity that does not seriously compromise ecological integrity; and, ideally, economic activity that positively enhances ecosystem health. The five general norms of land health mentioned a moment ago may serve, at least *prima facie*, as the ecological standards that a development project must meet in order to be judged “sustainable” in this sense.

But is sustainable development so understood possible? The surest proof of possibility is actuality. Here are some actual examples of mutually sustaining and enhancing human-nature symbioses.

The Desert Smells Like Rain by ethnobotanist Gary Nabhan is about present-day Papago dry farmers in the desert Southwest.⁵⁰ From time immemorial two oases some thirty miles apart, *A'al Waipia* and *Ki:towak*, had been inhabited by Papago. The former lies in the United States, in the Organ Pipe Cactus National Monument, and the latter in Mexico. The United States government designated *A'al Waipia* a bird sanctuary and stopped all cultivation there in 1957. Over in Mexico, *Ki:towak* is still being farmed in traditional style by a group of Indians. Nabhan reports visiting the two oases, accompanied by ornithologists, on back-to-back days three

times during one year. At the *A'al Waipia* bird sanctuary they counted thirty-two species of birds; at the *Ki:towak* settlement they counted sixty-five. A resident of *Ki:towak* explained this irony: "When the people live and work in a place, and plant their seeds and water their trees, the birds go live with them. They like those places. There's plenty to eat and that's when we are friends to them."⁵¹

Conservation biologist David Ehrenfeld concludes from this "parable of conservation" that "the presence of people may enhance the species richness of an area rather than exert the effect that is more familiar to us."⁵² In general, the whole desert ecosystem in which they live, not just the *Ki:towak* oasis, is as adapted to and dependent upon the Papago as they are on it. Their little *charco* fields, built to catch and hold the runoff from ephemeral desert rains, are home to a wide variety of co-evolved uncultivated plants (some of which the Papago eat) and unfenced animals ("field meat" as the Papago think of them). Undoubtedly the desert ecosystem has been enriched rather than impoverished by millennia of Papago habitation and exploitation.

Arturo Gomez-Pompa, on the basis of the higher incidence of fruit-bearing trees in the remnants of rainforest in southern Mexico, suggests that what appear to the untutored eye to be pristine patches of wilderness, rich in animal as well as plant life, are actually surviving fragments of an extensive lowland Maya permaculture.⁵³

On April 3, 1990, the *New York Times* reported that ecologists working in the Amazon have come to similar conclusions about the vast South American rainforest. Darrell A. Posey has studied the methods of living in the Amazon rainforest without destroying it devised by the Kayapo Indians. The Kayapo fish, hunt, gather, and cultivate swiddens. In sharp contrast to the displaced Euro-Brazilian peasants who are entering the region, the Kayapo, through a complex cycle of planting, manage to cultivate a forest clearing for nearly ten years, instead of merely three or four. But after a decade of cultivation, neither is a Kayapo plot simply abandoned. Instead, the Kayapo manage the regeneration of the forest by planting useful native species – first, fast-growing short-lived early succession plants like banana, and later, long-lived canopy trees like Brazil nut trees and coconut and oil palms. Thus their fallows become permanent resource patches from which they obtain fruit, nuts, medicines, thatch, and other materials in perpetuity.⁵⁴

I cite these indigenous New World examples of

human-nature symbiosis not to suggest that we give the hemisphere back to the Indians or that we all go native and attempt somehow to recreate American Indian culture in the late twentieth century. I simply wish to point out, rather, that the past affords paradigms aplenty of an active, transformative, managerial relationship of people to nature in which both the human and non-human parties to the relationship benefited. The human-nature relationship is an on-going, evolving one. We can, I am confident, work out our own, post-modern, technologically sophisticated, scientifically informed, sustainable civilization just as in times past the Minoans in the Mediterranean, the vernacular agriculturalists of Western Europe, and the Incas in the Andes worked out theirs.

The symbiotic win-win philosophy of conservation, which, I have argued here, lies at the kernel of Leopold's land ethic, is gradually replacing the bifurcated zero-sum approach as the twentieth century gives way to the twenty-first. For example, one of the most promising conservation stratagems in the Amazon rainforest today is the designation not of nature reserves from which people are excluded to protect the forest and its wildlife, but of so-called "extractive reserves."⁵⁵ An extractive reserve is an area where traditional patterns of human-nature symbiosis – such as those evolved by the Amazonian Indians and more recently by the rubber tappers – are protected from loggers, cattle ranchers, miners, and hydroelectric engineers.

Writing in *Nature*, Charles M. Peters, Alwyn H. Gentry, and Robert O. Mendelsohn report that the nuts, fruits, oils, latex, fiber, and medicines annually harvested from a representative hectare of standing Amazon rainforest in Peru is of greater economic value than the saw logs and pulpwood stripped from a similar hectare – greater even than if, following clear-cutting and slash-burning, the land is, in addition, converted either to a forest monoculture or to a cattle pasture. From a painstaking econometric study they conclude that "without question, the sustainable exploitation of non-wood forest resources represents the most immediately profitable method for integrating the use and conservation of the Amazonian forests."⁵⁶

Surely we can envision and work to create an eminently livable, systemic post-industrial technological society well adapted to and at peace and in harmony with its organic environment. If illiterate, unscientific peoples can do it, can't a civilized, technological society also live, not merely in peaceful coexistence, but in

benevolent symbiosis with nature? Is our current industrial civilization the only one imaginable? Aren't there more appropriate, alternative technologies? Can't we be good citizens of the biotic community, like the birds and the bees, drawing an honest living from nature and giving back as much or more than we take?

Perhaps the answer to some of these questions – the ones about what it is possible for us five billion Homo sapiens actually to achieve – is no. But certainly we can imagine and envision. At least we can entertain an environmental dream analogous to the social dream that Martin Luther King so eloquently articulated. We may take courage in the knowledge that lots of things – such as mechanical flight – that past skeptics thought were beyond human reach are now commonplace. Of course, an environmental utopia is no more realizable in toto than its several social analogues. But if we are to make progress toward a goal, it helps to have a target at which to aim, a dream, even while recognizing that all such visions are unattainable in full. There's no survival value in pessimism. A desperate optimism is the only attitude that a practical environmental philosopher can assume.

Notes

- ¹ Ralph Waldo Emerson, *Nature* (Boston: Beacon Press, 1989).
- ² Henry David Thoreau, *Excursions* (New York: Corinth Books, 1962), p. 185.
- ³ John Muir, *Our National Parks* (Boston: Houghton Mifflin, 1901).
- ⁴ Gifford Pinchot, *Breaking New Ground* (New York: Harcourt, Brace, and Co., 1947), pp. 325–326.
- ⁵ Pinchot, *New Ground*, p. 325.
- ⁶ *Ibid.*, p. xix.
- ⁷ *Ibid.*
- ⁸ *Ibid.*
- ⁹ Cf. Roderick Nash, *Wilderness and the American Mind* (Yale University Press, 1967) pp. 134ff.
- ¹⁰ Samuel P. Hayes, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement* (Cambridge: Harvard University Press, 1959).
- ¹¹ Aldo Leopold, 'The Wilderness and Its Place in Forest Recreation Policy', *Journal of Forestry* **19** (1921), 718–721; Aldo Leopold, 'Forestry and Game Conservation', *Journal of Forestry* **16** (1918), 404–411.
- ¹² Cf. Curt Meine, *Aldo Leopold: His Life and Work* (Madison: University of Wisconsin Press, 1989).
- ¹³ Aldo Leopold, 'A Biotic View of Land', *Journal of Forestry* **37** (1939), 727.
- ¹⁴ Aldo Leopold, *A Sand County Almanac: And Sketches Here and There* (New York: Oxford University Press, 1949), pp. 224–225.
- ¹⁵ Quoted in Nash, *Wilderness*, p. 5.
- ¹⁶ See Henry F. Dobyns, 'Estimating Aboriginal American Population: An Appraisal of Techniques with a New Hemispheric Estimate', *Current Anthropology* **7** (1966), 395–412.
- ¹⁷ See William Cronon, *Changes in the Land* (New York: Hill and Wang, 1983).
- ¹⁸ See Thomas M. Bonnicksen, 'Restoring Biodiversity in Park and Wilderness Areas: An Assessment of the Yellowstone Wildfires', in A. Rasmussen (ed.), *Wilderness Areas: Their Impacts* (Logan: Utah State University Cooperative Extension Service, 1990).
- ¹⁹ Aldo Leopold, 'Wilderness', in S. L. Flader and J. B. Callicott (eds.), *The River of the Mother of God and Other Essays by Aldo Leopold* (Madison: University of Wisconsin Press, 1991), pp. 226–227.
- ²⁰ 'The Farmer as a Conservationist', *American Forests* **45** (1939), 294–299, 316, 323.
- ²¹ *Ibid.*, p. 294.
- ²² Aldo Leopold, *Sand County*, p. 207.
- ²³ See Daniel Botkin, *Discordant Harmonies: A New Ecology for the Twenty-First Century* (New York: Oxford University Press, 1990).
- ²⁴ Michael E. Soulé, 'The Onslaught of Alien Species, and Other Challenges in the Coming Decades', *Conservation Biology* **4** (1990), 234.
- ²⁵ See R. M. May, *Stability and Complexity in Model Ecosystems* (Princeton: Princeton University Press, 1973); and Daniel Goodman, 'The Theory of Diversity-Stability Relationships in Ecology', *The Quarterly Review of Biology* **50** (1975), 237–266.
- ²⁶ Kristin Shrader-Frechette, 'Ecological Theories and Ethical Imperatives: Can Ecology Provide a Scientific Justification for the Ethics of Environmental Protection?', in W. R. Shea and B. Sitter (eds.), *Scientists and Their Responsibility* (Canton, Mass.: Watson Publishing International, 1989), pp. 73–104.
- ²⁷ Leopold, *Sand County*, p. 221.
- ²⁸ Cf. Curt Meine, *Aldo Leopold*.
- ²⁹ Plato, Republic, B. Jowett, tr., *The Dialogues of Plato*, Vol. 1 (New York: Random House, 1937), p. 709.
- ³⁰ *Ibid.*
- ³¹ Aldo Leopold, 'Wilderness as a Land Laboratory', *The Living Wilderness* **6** (1941), 3.
- ³² *Ibid.*
- ³³ *Ibid.*
- ³⁴ *Ibid.*
- ³⁵ *Ibid.*
- ³⁶ Aldo Leopold, 'Conservation: In Whole or in Part', in *The River of the Mother of God*, p. 310.
- ³⁷ *Ibid.*
- ³⁸ *Ibid.*, p. 312.
- ³⁹ *Ibid.*
- ⁴⁰ *Ibid.*, p. 315.
- ⁴¹ *Ibid.*
- ⁴² *Ibid.*
- ⁴³ Leopold, 'Wilderness', p. 227.
- ⁴⁴ Leopold, 'A Biotic View', p. 729.
- ⁴⁵ Susan L. Flader, *Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude toward Deer, Wolves, and Forests* (Columbia: University of Missouri Press, 1974).
- ⁴⁶ Eugene C. Hargrove, *Foundations of Environmental Ethics* (New York: Prentice Hall, 1989).

⁴⁷ David J. Schaeffer, Edwin H. Herricks, and Harold W. Kerster, 'Ecosystem Health: I. Measuring Ecosystem Health', *Environmental Management* 12 (1988), 445–455; David J. Rapport, 'What Constitutes Ecosystem Health', *Perspectives in Biology and Medicine* 33 (1989), 120–131; Brian H. Walker, 'Biodiversity and Ecological Redundancy', *Conservation Biology* 6 (1992), 18–23.

⁴⁸ The World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987).

⁴⁹ Such a view is attributed to William Nordhaus and James Tobin by Peter Passell, 'Rebel Economists Add Ecological Costs to Price of Progress', *New York Times* (Nov. 27, 1990), B5–B6.

⁵⁰ Gary P. Nabhan, *The Desert Smells Like Rain: A Naturalist in Papago Country* (San Francisco: North Point Press, 1982).

⁵¹ Quoted by Ehrenfeld, 'Life in the Next Millennium: Who Will Be Left in the Earth's Community', *Orion Nature Quarterly* 8 (Spring 1989), p. 9.

⁵² *Ibid.*

⁵³ Arturo Gomez-Pompa and Andrea Kaus, 'Conservation by Traditional Cultures in the Tropics', in Vance Martin (ed.), *For the Conservation of the Earth* (Golden, Col.: Fulcrum, 1988), pp. 183–194.

⁵⁴ William K. Stevens, 'Research in "Virgin" Amazon Uncovers Complex Farming', *New York Times* (April 3, 1990), B5–B6.

⁵⁵ Susanna Hecht and Alexander Cockburn, *The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon* (New York: Verso, 1989).

⁵⁶ Charles M. Peters, Alwyn H. Gentry, and Robert O. Mendelsohn, 'Valuation of an Amazonian Rainforest', *Nature* 339 (1989), 656.

University of Wisconsin – Stevens Point