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As a public service, Laucks Foundation calls attention to published material that might contribute toward clarification of issues affecting world peace, equity among peoples and environmental responsiblity.

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## NOTICE OF CHANGE

Beginning in 1995, the **Reprint Mailing** will be published quarterly instead of bi-monthly. The next issue, No. 135, will appear in March, 1995

***"Every parent knows that it is much easier for a two year old to make messes than it is to clean them up. The same is true in the realm of intellect and public policy as well. It is easier for demagogues to cast doubt, confuse, obfuscate, and muddy the water than it is to clarify great and complex issues. And in both cases it takes far longer to clean up the mess than it did to make it in the first place."***

**- David Orr**

This issue of the **Reprint Mailing** is devoted to three essays by David Orr, Professor of Environmental Studies at Oberlin College. They appeared in 1993 and 1994 in the journal **Conservation Biology**. Professor Orr's new book, **Earth in Mind: On Education, Environment, and the Human Prospect**, was published recently by Island Press (Washington DC).

(Essays are reprinted with Professor Orr's permission)

# Educating a Constituency for the Long Haul

In *Earth in The Balance,* Al Gore, the U.S. vice president, proposes making "the rescue of the environment the central organizing principle for civilization" (1992, 269). Gore is, in effect, calling for a global constituency for the long haul, one oriented to the health of the planet, with a decent regard for the rights and interests of future generations, and a degree of self-denial quite unusual in an upstart species that still mostly believes itself to be the master of all that it surveys and deserving of all that it can take.

That such a constituency is essential to our prospects is clear enough, but it may never come to exist to the extent necessary to rescue the earth or, more to the point, to rescue the human prospect on the earth. It certainly will not be created easily and quickly. Aside from the possibility that evolution has made us much more adept at dealing with visible threats like marauding armies than with invisible ones measured in parts per billion or possibilities of future catastrophe (Ornstein & Ehrlich 1989), there are other serious obstacles to the creation of any effective constituency for the long haul.

First, every parent knows that it is much easier for a two year old to make messes than it is to clean them up. The same is true in the realm of intellect and public policy as well. It is easier for demagogues to cast doubt, confuse, obfuscate, and muddy the water than it is to clarify great and complex issues. And in both cases it takes far longer to clean up the mess than it did to make it in the first place. . .

Something like this is now evident in recent efforts to render science subservient to politics, ideology, and at times even fantasy. The politicization of science has become a growth industry. Rush Limbaugh, for example, a radio and television talk show host of enormously modest modesty, believes that ozone depletion is a fraud foisted on a gullible public by scientists wanting more research money. I do not think that scientists (or radio talk-show hosts for that matter) are always above deceiving the public. On closer examination, however, Limbaugh's views turn out to be a combination of scientific errors compounded by the ideology of buccaneer capitalism magnified by an enlarged ego and multiplied by the power of modern communications (Taubes 1993). Trusting Mr. Limbaugh's facts and opinions and unwilling to investigate further, millions of his listeners now believe that we need not worry about the effects of ozone depletion, climate change, or any other environmental issue for that matter.

Mr. Limbaugh is not alone. An odd alliance of rapacious corporations, right-wing extremists, and aggrieved landowners is also undermining good science and sound public policy in the cause of exploitation. With no detectable humor or irony, one such group in the United States calls itself the "wise use movement." They are now hard at work infiltrating public school boards, state legislatures, and boardrooms.

A second and even more pervasive barrier to the creation of a constituency for the long-term is the widespread tendency to deny the seriousness of our situation. There is no honest way around the reality that the big numbers having to do with population growth, disruption of the earth's biogeochemical cycles, species extinction, and the health of soils, forests, and water are running against us. No one of these is necessarily fatal to our prospects. Taken together, however, they point inescapably to the conclusion that we do not have much time to set things right if we are to avoid major traumas in the decades ahead. The momentum of big numbers is sweeping us toward a precipice, but the words, concepts, theories, and stories essential to comprehend our situation are not yet part of our political language or public mindset.

A third force working against us is the widespread belief that citizenship requires little or nothing of us. The idea of cheap citizenship is founded on the theology of the lottery: that one does not reap what one sows. It follows, then, that one need not sow at all, and that reaping is only a matter of luck, chicanery, or happenstance, not hard work, skill, and obligation. The mindset of cheap citizenship owes, in part, to decades of televised bamboozlement. Some of it reflects the lingering effects of self-indulgences past, notably those of the 1980s. But the

idea that one can get something for nothing is also built into the modern mind, which believes in nothing quite so zealously as it does in the heroic power of technology to absolve us of ecological malfeasance and ineptitude.

Recent congressional discussion about reducing the U.S. deficit provided a textbook study of cheap citizenship. All participants conceded, more or less, the seriousness of the situation while professing the inability of their constituents to do anything about the causes that led to huge deficits. The philosophy of cheap citizenship likewise prevents any serious discussion about paying the full costs of what we consume, including the costs of biotic impoverishment.

Real citizens pay their bills, exercise foresight, assign costs and benefits fairly, work hard at maintaining their communities, and are willing to sacrifice when necessary and consider doing so a privilege. All of this is to say that authentic citizenship—political and ecological—is not cheap, but sooner or later, it is less costly by far than dereliction and counterfeit citizenship.

Fourth, the news media often work against the creation of a constituency for the long term. In its quest for high ratings, television news, for example, has become little more than entertainment. If the end of the world arrives anytime soon, it will be brought to us by all of the major networks, each competing for the highest Nielsen ratings. The sponsors will include many of the corporations whose various activities made the event possible. We, the viewing public, will be dazzled by the graphics, amazed by the artistry of the advertisements, charmed by blow-dried reporters, sobered by the gravity of various commentators, and overcome by the spectacle of it all—entertained right into oblivion.

To entertain, it is necessary to create conflict and dramatic tension, often where none exists. Why is it, for example, that E. O. Wilson's views on species extinction are often "balanced" by counterarguments of people such as economist Julian Simon, whose knowledge of the issue is vaporous? Similarly, recent reports of divergent opinions about trends in the average temperature of the earth were framed to appear as if scientists were in serious disagreement. Satellite recordings of temperatures four miles above the surface of the earth reveal no upward trend, while ground temperatures (until the eruption of Mt. Pinatubo) showed a sharp increase from 1980 through 1991. These are different and not necessarily conflicting data. To the average reader, however, the story appears to give yet one more reason to believe that scientists do not agree about the reality of global warming, hence one more reason to procrastinate (Washington Post Weekly, 1993). In the meantime real disagreements, including those about the larger risks and the ethics of our taking such risks for no good reason, go largely unmentioned.

## Upshot

A constituency able and willing to fight for the long-term human prospect must be educated into existence. It must be scientifically literate enough to recognize politicized science for what it is. It must be courageous enough to face facts squarely. It must be committed enough to avoid the seductions of cheap citizenship. And it must be intellectually alive enough to demand careful and thoughtful analysis of public problems. This will require in Paul Kennedy's words, "nothing less than the re-education of humanity" (Kennedy 1993, 331).

But there's the rub. What are schools, colleges, and universities doing to re-educate the citizenry or their own faculty, administrations, and trustees for that matter? The short answer is not nearly enough, and in most cases the answer is nothing at all. Even in this time of ecological concern, high schools, colleges, and universities continue to turn out a large percentage of graduates who have no clue how their personal prospects are intertwined with the vital signs of the earth. How could this be? Dartmouth College professor, Noel Perrin, believes it to be a failure of leadership: "neither the trustees nor the administration [of this or any other college and university] seems to believe that a crisis is coming" (Perrin 1992). They comprehend the situation intellectually, Perrin believes, but they do not yet feel it at a gut level where action begins. Yale University historian, Yaroslav Pelikan, similarly questions the

> readiness of the university community to address the underlying intellectual issues and moral imperatives of having responsibility for the earth, and to do so with an intensity and ingenuity matching that shown by previous generations in obeying the command to have dominion of the planet (Pelikan 1992, 21).

Among those familiar with education, few would disagree with such skepticism. But this is an opportune time to change things, beginning with the public schools. President Clinton has proposed legislation to create educational standards and assessment procedures in every state of the U.S. The President and Vice President should insist that ecological literacy be made central to any such standards so that no young person graduates from high school without knowing how the earth works as a physical system. They should insist further that the debate about national educational standards be informed by the recognition that the crisis of global ecology is first and foremost a crisis of values, ideas, perspectives, and knowledge, which makes it a crisis *of* education, not one *in* education.

To meet that crisis effectively we will need a thorough overhaul of educational goals and pedagogy at all levels, not more tinkering. As possible guidelines for that process I suggest the following.

1. All education is environmental education. By what is included or excluded, emphasized or ignored, we unavoidably teach students that they are part of or apart from natural systems.
2. The process of education is as important as its content. For this reason, good environmental education tends to stress experience, practical skills, and interdisciplinary learning. And a great deal of it necessarily occurs outdoors.
3. Academic architecture is a kind of crystallized pedagogy which ought to reflect our citizenship in the biotic community by utilizing solar energy, recycling wastes, using environmentally benign materials, eliminating toxics, and encouraging biological diversity.
4. Schools, colleges, and universities educate by what they do as well as by what they say. For this reason all educational institutions should aim to minimize the environmental costs of campus operations and resource flows of energy, materials, food, water, and waste and use their buying and investment power to support the emergence of sustainable regional economies.
5. The goal of education should be to equip young people for service, not for upward mobility measured by lifetime income.
6. There is an irreducible body of knowledge that all students should know, including: how the earth works as a physical system; basic knowledge of ecology and thermodynamics; the vital signs of the earth; the essentials of human ecology; the natural history of their own region; and the kinds of knowledge that will enable them to restore natural systems and build ecologically resilient communities and economies.

National and international leadership on educational goals and standards, necessary to focus attention, articulate larger issues, and redirect resources, cannot, however, replace committed and visionary teachers and administrators in every educational institution. For this reason a constituency for the long-term will also require systematic efforts everywhere to re-educate teachers and administrators so that they understand what the long-term will require of them.

David W. Orr

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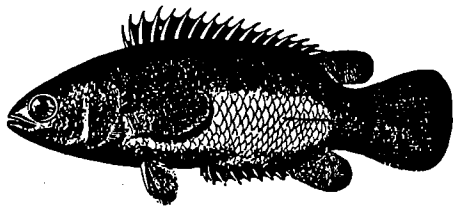

# The Effective Shape of Our Future

> It ain't what we don't know that gives us trouble, it's what we know that ain't right.
>
> —Will Rogers

At the top of my list of the things that we know that "ain't right" I would place the belief that we are now an urban species and that by and large this is a good thing or at least one that cannot be changed. For 99% of our evolutionary career, however, *Homo sapiens* lived in small bands and tribes in places that would now be considered wilderness. For most of the remaining 1% we were either rural or lived in small hamlets and towns surrounded by countryside. From an evolutionary perspective, the vast megapolitan areas of the 20th century are a sudden aberration.

Believers in the urban ideology presume that our rural origins are unimportant and often go on to assume that: (a) a prosperous and democratic culture does not require a stable and prosperous rural foundation; (b) we are smart enough to provision megapolitan areas with food, water, energy, materials, public safety, transport, employment, and entertainment, and to dispose of their wastes, and do all of these things in perpetuity; (c) cities, in contrast to everything else on earth, have no maximum size beyond which they decay or collapse; (d) urban and suburban life can satisfy our deepest human needs; and (e) we will never change our minds. Urban boosterism masks a wager of sorts that our evolutionary past is of no consequence, our bets do not need to be hedged, and that "nature does not set booby traps for unwary species" as biologist Robert Sinsheimer once put it.

I offer a demurral and explore some of its implications for conserving biological diversity and for education. First, however, I must bow to the numbers that show unequivocally that humans continue to herd themselves into metropolitan regions. The United States, for example, is overwhelmingly urban and suburban and becoming even more so. In 1950 almost half of Americans still lived in rural areas. By 1990, however, the number was less than one in four (22.9%), and only 1.9% of Americans lived on farms. (*New York Times,* September 11, 1990, A-12). Within a few years 50% of the earth's people will be urban and that number, we are told, will continue to rise until the vast majority will be city folk. What is it about these numbers that "ain't right"? What long-term forces could possibly stop or even reverse the trend toward urbanization?

You can make your own list, but mine includes such things as the end of the era in which we can burn cheap fossil fuels and ignore ecological costs—it is cheap fossil energy that allows us to provision large urban populations; the vulnerability of concentrated populations to new diseases like AIDS and ebola and the return of old ones such as tuberculosis in more virulent form (McMichael 1993; Preston, October 26, 1992; Chivian 1993: 216); the decline of ecological resilience worldwide because of species loss, desertification, deforestation, soil erosion, climatic change, and other factors such as increased ultraviolet radiation that will reduce the surpluses that provision cities; the unmanageability of all cities beyond a certain size, and not the least; the preferences of a persistent majority of people who say they would rather live in small towns or rural areas were it economically feasible to do so.

In the face of epic changes looming in the century ahead it is difficult to avoid the conclusion that "Long before 2030 the trend toward ever larger cities and an increasing ratio of urban-to-rural dwellers is likely to have reversed" (Brown et al. 1990: 188). The question, I think, is not whether the urban tide will ebb, but when, how, how rapidly, and whether by foresight or happenstance. In other words, the choice is whether those returning to rural areas in the century ahead do so, in the main, willingly and expectantly with the appropriate knowledge, attitudes, and skills or arrive as ecological refugees driven by necessity, perhaps desperation. Even if the former, reruralization will not be a return to a mythical agrarian past, although there are traditions that need to be dusted off and put to use again. The reruralization of the next century, if it is done right, will require a com-



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bination of invention and rediscovery.

What does the possibility of an urban diaspora have to do with the conservation of biological diversity? Simply this: if large numbers of people reinhabit rural areas ignorantly and carelessly, the effects on biological diversity and ecosystems will be devastating. If so, present rates of species extinction will pale by comparison, bringing to ruin the efforts to halt the rapid decline of biological diversity. The contemporary experience of ecological refugees in parts of the third world or of suburban sprawl and uncontrolled rural development elsewhere point to the same conclusion. Yet no country has a policy worthy of the name to plan future reruralization, and none to my knowledge believes this to be either important or desirable.

What does the prospect of reruralization have to do with education? Whether it occurs in a way that conserves biological diversity or not will be determined, in large part, by what people returning to rural areas know, what they expect, and what they can do. Who will teach these things? Rural cultures virtually everywhere are in disarray and decline. Moreover there are few schools or colleges that aim to equip students with the skills and aptitudes necessary to develop sustainable and sustaining rural cultures. As a result, today's high school or college graduate is poorly prepared for any but a fossil fuel–powered, urban existence. For all of the fashionable talk about cultural diversity, schools, colleges, and universities have been agents of fossil energy–powered urban homogenization. There is one curriculum, which, as Wes Jackson notes, prepares the young for "upward mobility" in an urban world (Jackson 1994: 3). We educate the young, from country and city alike, to be urban with urban appetites, skills, minds, dependencies, and expectations. But if the human future will be as much (or more) rural as urban what will the young need to know?

For one they will need to know how to do more than they are now being taught to do. But a considerable number of skills useful for rural life in a post-fossil fuel world are being lost. An Amish friend of mine, for instance, describes his father in these words:

> Father was one of those rare people who possessed many of the arts and skills needed in thriving rural communities. Besides being a farmer and a husbandman, he was a thresherman (a title that also included silo filling, corn husking with the machine, fodder shredding, and clover hulling), a sawyer, an orchardist, his own mechanic, a carpenter (he could design and build anything from kitchen cabinets to mortise and tenon frame buildings), for a short time his own blacksmith, plumber, and for a while he even whitewashed our milking stable using the orchard sprayer. (Kline 1994)

Outside the Amish community, however, these are no longer common skills. But the more serious loss is the decline of the qualities of mind that permit skill to flourish. A mind that knows how to do many things well has a complexity, agility, and resilience unknown to the specialist (what Nietzsche called an "inverted cripple," i.e., one with a single overdeveloped faculty instead of an impaired one). This is a mind capable of shifting from one material to another, from one set of tools to another, and from mechanics to biology to animal husbandry all in the same day. It is a mind with the wherewithal to design, build, repair, grow, heal, form, tinker, orchestrate, improvise, neighbor (a verb), and tell good stories: a mind with range and stretch to it.

Second, the young will need more practical knowledge of nature in the raw than they now have. They will need to be serious students of nature and of their places. If we intend to preserve biological diversity we will have to build a sizeable constituency whose livelihood depends on it, not just an informed electorate who vaguely understand biodiversity to be important but could not say why if their own lives depended on it. This kind of detailed knowledge about how nature works comes only from patient and alert observation of a particular place. Writing about the location of fruit trees in the landscape, for example, farmer and writer Gene Logsdon, says:

> Grow sun-loving fruit trees as forest-edge trees. In nature that's where the fruit-bearing trees are. They grow on forest edges and will not survive the shade of the deeper woods. Another advantage of forest edges is that the forest ameliorates the temperature on frosty nights a little... Fruit trees, by the same token are excellent trees to grow in fencerows where in addition to plenty of light, the grazing animals are handy for eating up the drops and surplus fruit.... but the main reason for scattering fruit trees out along forest edges and fencerows is that these trees are, in my experience, harmed less by insect predation than the ones clustered in the more formal orchard. (Logsdon 1994: 136)

This is useful knowledge. It is the kind of knowledge that enhances biological diversity and promotes "integrity, stability, and beauty" in working landscapes, with a bit of cash on the side. It is the kind of knowledge that comes from affection for a particular place, the necessity to earn a living from it, and the understanding that biological diversity enhances the living in the fullest sense of the word. It was not generated as a research project, but as an act of pleasure and stewardship. It is the kind of knowledge, moreover, that is needed in order to imagine and create ecologically complex landscapes that include well-managed farms and forests, wilderness, wildlife, a diverse biota, renewable energy technologies, fewer roads, and rural economies artfully woven into ecosystems (Thayer 1994: 243). In fact, there is no other realistic model of "sustainable development" as world population rises from 5.5 billion to 12 billion in the 21st century.

Third, rural societies have often been closed and intolerant, and sometimes, as Karl Marx noted, they were full of "idiocy." Accordingly, the young will need to know how to remodel old rural institutions and, in some cases, create new ones that work better. For this they will need an unprecedented degree of economic creativity and social inventiveness. Better rural communities, by which I mean ones that are more inclusive, democratic, and intellectually vibrant, must first be imagined. The outlines of such communities are emerging in experiments with community-supported farms that sell produce directly to nonfarm subscribers, rural development banks, land trust, and local currency systems (Jacobs 1994: 158–178). I know of no perfect models of rural communities, but there are good ones from which we might learn a great deal including the Amish in the U.S., the Mondragon cooperatives in Spain, and the province of Kerala in India.

The skills and aptitudes necessary to build sustainable rural economies are not so different from those that will be required to rebuild cities along more sustainable lines (Platt et al. 1994). That project, too, will require greater know-how, a more thorough knowledge of nature, ecological imagination, and social inventiveness. Urban landscapes will have to become more biologically diverse with more city farms, gardens, greenways, marshes, parks, forests, and wildlife. Whether rural or urban the critical question is where will the young learn these things?

One interesting answer to that question is offered in the work of Rutgers University professor Michael Hamm who has organized an urban gardening program for children, adolescents, and older citizens of New Brunswick, New Jersey. Hamm's project is intended to convey knowledge about gardening, composting, agriculture, nutrition, ecology, and direct marketing while helping an inner city community take control of a significant part of its food supply. In its first year of operation (1993) the community harvested over 5000 lbs of fresh vegetables, fruits, and herbs of which 1000 lbs was donated to area soup kitchens and senior centers. Hamm has plans to extend the program to other New Jersey cities including Perth Amboy and Newark. This is an effort worthy of emulation elsewhere under the sponsorship of colleges and universities. Its inclusion of children and adults in the same educational process is particularly promising in a reruralizing urban society in which ignorance will not be based on age.

A second answer is taking shape near Mansfield, Ohio, at Malabar Farm, begun by Louis Bromfield in 1939. Bromfield, a writer of considerable distinction, founded Malabar as an agricultural demonstration and experimentation center. After his death in 1956, Malabar eventually became an Ohio State Park. Efforts are now underway to pick up where Bromfield left off, making Malabar a "comprehensive learning center for the future" focused on agriculture and conservation. Every state, province, and region will need similar kinds of institutions to maintain and advance the know-how and know-why needed for a more rural world.

For a world destined to be as much rural as urban, agriculture will become more, not less, important for a large number of people. British sociologist, Raymond Williams once put it this way:

> If we are to survive at all, we shall have to develop and extend our working agricultures. The common idea of a lost rural world is then not only an abstraction ... it is in direct contradiction to any effective shape of our future, in which work on the land will have to become more rather than less important and essential (Williams 1973, p. 300).

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David W. Orr

# Forests and Trees

"I am convinced," Aldo Leopold wrote in 1942, "that most Americans have no idea what a decent forest looks like. The only way to tell them is to show them" (Flader & Callicott 1991: 294). Imagine, however, if we were unable to show them little more than a few pollution-drenched, biologically impoverished remnant forests, or industrial forests where trees are grown like corn.

This bleak prospect is no longer the hypothetical nightmare that it once seemed to be. Excessive logging, corporate monocultures, agriculture, urbanization, road building, recreational development, and air pollution are reducing forested areas around the world and radically undermining the integrity of those that remain. Tropical and temperate forests are disappearing fast. Preparations are underway to cut the great boreal forests of Russia. The United States is now engaged in a contentious debate about whether we should save the last 5–10% of ancient forests in the Northwest or preserve one final decade or so of logging jobs. Overall, the world loses 37,000,000 acres of forest each year (Perlin 1989: 15). Chateaubriand's old lament that forests precede civilization and deserts follow is now a global reality.

More is at stake, however, than the fate of an economic resource. With only pathetic remnants of once majestic forests, how will we instill the *idea* of "decent" forests in the young whose minds are increasingly warped by television, Nintendo, MTV, shopping malls, freeways, and those sensory deprivation chambers we call suburbs? We are never more than one generation away from losing the idea of forests as places of wildness and ecstasy, mystery and renewal, as well as the knowledge of their importance for human survival. We can now foresee a time, not far off, when no one virtually anywhere will remember the aboriginal forest. But the power behind the idea of decent forests depends on the experience of decent forests, not on second-hand, bookish abstractions.

How should teachers and educational institutions respond to the worldwide decline in forests? There is good reason to believe that the question has not yet been asked in the upper echelons of higher education. Officials at the University of California/Santa Cruz, for example, recently announced plans to sell off 440 acres of forest which includes 50 acres of old growth redwood trees, some more than 700 years old (*San Francisco Chronicle,* April 24, 1993). The land was donated to the University of California in 1942 by a retired professor and his wife. The news account does not describe the donors' expectations about the use of the land or any restrictions on its resale. The tract is now worth an estimated $1,000,000. Not surprisingly, the decision was motivated by budget cuts imposed by the state of California amounting to over $11,000,000 on the Santa Cruz campus alone. By selling the land, the University can reduce its management costs by $25,000 per year, eliminate any potential liabilities attached to the land, and get a one-time windfall amounting to 9% of its budget deficit.

The news account ends by noting that "the deans of all the academic division ... have reviewed the proposal to sell and have found that there is no academic interest to be served by retaining the property." As one senior professor put it to me: "The University is an educational institution, not a biodiversity organization." The executive director of the Save-the-Redwoods League, Mr. John B. Dewitt, disagrees, saying that the "university should retain the property for the benefit and use of the students and faculty ... for research and recreation."

I know neither the particular land in question, nor the financial details of the case beyond what is contained in the newspaper account. I do know, however, that the story is increasingly familiar. More and more colleges and universities are willing to sell off natural areas in their possession and use the proceeds for what administrators regard as more practical purposes. A few have participated in large-scale commercial developments on university owned lands. Such actions say more than any number of glossy publications or learned speeches about the real institutional priorities, which apparently do not have much to do with trees, forests, and biodiversity. Land holdings, including those in forested land, are appraised mostly for their cash value, not for their value in preserving biodiversity or in educating the young about forests.

Intended or not, decisions to sell off natural lands do have an effect which can be rightly described as educational. Colleges and universities educate by what they do as well as by what they say. Students no doubt will observe that when the going gets a wee bit tough, their intellectual mentors and role models regard natural lands and whatever biological diversity they hold as expendable. They will note that those presuming to educate them rarely see any serious educational value in wild lands or in ancient trees. Whether outraged or apathetic, they will see that universities, which pay their CEOs, various deans, and football coaches six figure salaries, can seldom find the relatively small amounts of money necessary to manage increasingly rare natural areas. Students may even note the discrepancy in the minute efforts to fund such things as opposed to that exerted to fund, say, campus parking facilities. Alert students may also make the correlation between such decisions and the manifest decline in their life prospects. All of this provides a liberal education in how educational institutions work and how, sometimes, they don't work for the good of the world the students will inherit.

The willingness of institutions to preserve natural areas is, however, only a small part of a larger problem. In a culture that regards land as a commodity, it is easy to think of forests and natural areas as merely resources expendable to support other, and more serious, things. This attitude reflects a deep conflict between humankind and forests as old as civilization itself. In the *Epic of Gilgamesh* (circa 4700 B.C.; Sandars 1972) the hero kills the appointed guardian of the forests so that he can "strip the mountains of their cover." By cutting down the cedar forest, he intends to "leave behind me an enduring name." The angry gods' reprisal, predictably, takes the form of a series of ecological curses. "It is a sorry fact of history," in Robert Harrison's words, "that human beings have never ceased reenacting the gesture of Gilgamesh." (Harrison 1992: 18) The epic and its historical reenactment down through the ages is a story of violence and madness. The same can be said about the destruction of forests in our time. Forests have been a mirror of sorts, reflecting back whatever humans wished to see. Minds receptive to mystery, like that of John Muir, have seen forests as sacred places. Thoroughly utilitarian minds see little more than something to sell, whether board feet or visitor days. University administrators hard pressed for cash see windfall profits. But whatever our rationalizations and practical material needs, "there is too often," in Harrison's words, "a deliberate rage and vengefulness at work in the assault on nature and its species."

In the coming century humankind will need healthy forests more than ever, both for practical reasons of survival and to preserve our sanity, an utterly practical reason. The effort to rethink ancient habits and antagonisms must begin with a different kind of education in which forests become a significant part of the general curriculum. That will require confronting paradoxes deeply embedded in the curriculum about forests and their relation to human progress.

Madhav Gadgil and Ramachandra Guha describe two such paradoxes, the first of which has to do with the fact that:

> hunter-gatherers live *in* the forest, agriculturalists live adjacent to but within *striking distance* of the forest, and urban-industrial men live *away* from the forest. Paradoxically, the more the spatial separation from the forest the greater the impact on its ecology, and the further removed the actors from the consequences of this impact! (Gadgil & Guha 1992: 52)

In other words, forests out of sight are forests out of mind. Civilization was planted in a clearing both literally and figuratively. As civilization grew, forests receded, becoming ever more peripheral to our imagination and to our sense of reality. Our use of forests, accordingly, has become increasingly mindless, driven by large impersonal forces that undermine our long-term prospects.

The second paradox is even more threatening to our established academic ways:

> the faster the development of formal, scientific knowledge about the composition and functioning of forest types, the faster the rate of deforestation ... the belief that science provides an infallible guide has nonetheless encouraged major interventions in natural ecosystems, and these have had unanticipated and usually unfortunate consequences. The history of both fisheries and forest management are replete with illustrations of the failure of sustained-yield methods to forestall ecological collapse ... *religion and custom as ideologies of resource use are perhaps better adapted to deal with a situation of imperfect knowledge than a supposedly 'scientific' resource management.* [emphasis added] (Gadgil & Guha 1992: 52)

In other words, in dealing with complex systems, about which we know relatively little, humility that leaves a large margin for error is smart over the long haul. "The forest," in Richard Manning's words, "is a wonder beyond our comprehension" (1992: 171). Much of it will remain beyond our comprehension, science notwithstanding. Accordingly, we will need a different manner of thinking about forests that acknowledges forthrightly the limits of our knowledge and our inconstancy in using what knowledge we do have.

The observations of Gadgil and Guha have significant implications for education. Resolution of their first paradox requires bringing trees to the forefront of our consciousness. This can be done, first, by changing the philosophy of landscape management in which trees on the campus are regarded as little more than decoration. Most colleges and universities intend for their campuses to look like country clubs, weedless and biologically sterile places maintained by an unholy ar-

ray of chemicals. Campus landscapes ought to be more imaginatively designed to promote biological diversity, ecological resilience, and to raise the collective ecological IQ of the campus community. Campuses ought to be maintained as natural areas that harbor biological diversity. The institutional calendar might also include annual celebrations around tree planting and landscape restoration. Who knows, perhaps even administrators might be persuaded to take a walk in a woods!

Resolution of Gadgil and Guha's second paradox will require the integration of forests throughout the curriculum so that all students know beyond any shadow of a doubt how their prospects are intertwined with those of forests. A generation that will need the ecological services of forests more than any previous generation will need a deeper comprehension of how forests work (Maser 1989). They will need better political and social mechanisms to protect forests, now vulnerable to the tragedy of the commons on a global scale. They will need honest economics that account for all the values of forests (O'Toole 1988; Panayotou & Ashton 1992; Repetto & Gillis 1988). They will need to know the historical relationship between forests and their own history (Williams 1989). They will need to know a great deal about the practical uses of trees in working landscapes (Smith 1988). They will need to understand the relationship between forests and the evolution of the human mind (Harrison 1992). They will need a larger idea of forests and wildness than that contained in the industrial worldview (Oelschlaeger 1991). They too will need stori[illegible]hs that give purpose an[illegible] the experience of for[illegible]y will need the exampl[illegible]s willing to fight for ev[illegible]ods, scrap of remaining wilderness, and every decent forest.

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