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CHAPTER 8

Earth Ethics

A Challenge to Liberal Education

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ETHICS ON THE HOME PLANET

This is the home planet. Views of Earth from space have given us a first approximation of an emerging vision of Earth and the place of human life upon it. "Once a photograph of the Earth, taken from *the outside* is available . . . a new idea as powerful as any in history will be let loose"[1] That idea is one world or none, the unity of the home planet, our global responsibility. Leaving home, we discover how precious a home is. The distance lends enchantment, brings us home again. The distance helps us to get real. We get put in our place. We learn who we are and where we are.

A virtually unanimous experience of the hundred or more astronauts, from many countries and cultures, is the awe experienced at the first sight of the whole Earth — its beauty, fertility, smallness in the abyss of space, light and warmth under the sun in surrounding dark-

ness, and, above all, its vulnerability.[2] They are grasped and transformed by an astonishing encounter with Earth as it truly is—in the words of Edgar Mitchell, "a sparkling blue-and-white jewel ... laced with slowly swirling veils of white ... like a small pearl in a thick sea of black mystery."[3] The most important spin-off of the space program is to leave us earthstruck.

The home planet is in crisis. The two great marvels of our planet are life and mind, both among the rarest things in the universe, unknown elsewhere. Life, including human life, is a product of evolutionary natural history. The human brain and hand produce culture superposed on natural systems. Diverse combinations of nature and culture worked well enough over many millennia, but no more. Our modern cultures threaten the integrity, stability, and beauty of Earth and thereby of the culture superposed on Earth. Behind the vision of one world is the shadow of none.

We are searching for an ethics adequate to respect life on this home planet. Earth is the only planet in our solar system with an ecology, the only planet that is a home; and, on Earth, home to multiple millions of species, humans are the only species of moral agents. Earth is the only planet "right for life," and ethics asks about the "right to life" on such a planet. Certainly it seems "right" hat life continue here; life is, in the deepest sense, the most valuable phenomenon of all on Earth, with its prolific history since the origin of life three and a half billion years ago.

The late-coming, moral species, *Homo sapiens*, arising a few hundred thousand years ago, has, even more so lately, gained startling powers for the rebuilding and modification, including the degradation, of this home planet. The four most critical issues that humans currently face are peace, population, development, and environment. All are entwined. Human desires for maximum development drive population increase, escalate exploitation of the environment, and fuel the forces of war. Those who are not at peace with one another find it difficult to be at peace with nature and vice versa. Those who exploit persons will typically exploit nature as readily—animals, plants, species, ecosystems, and Earth itself.

An interhuman ethics must serve to find a satisfactory fit for humans in their communities, and, beyond that, an environmental ethics must serve to find a satisfactory fit for humans in the larger

communities of fauna and flora. We worried throughout this century that humans would destroy themselves in interhuman conflict; that fear has subsided somewhat only to be replaced by a new one. The worry for the next century is that humans may destroy their planet and themselves with it. If we humans are true to our species epithet, "the wise species" needs to behave with appropriate respect for life. That will involve an interhuman ethics. Will it also involve an interspecific ethics? An Earth ethics?

Answering this question is a fundamental challenge to the universities of the world. These universities are part of the problem. They have produced the knowledge by which humans have gained their startling powers for the rebuilding and the degradation of this home planet. The knowledge accumulated in the universities, transmitted from one generation to the next, is of great genius. Yet it has destabilized human life on our home planet. Both the sciences and the humanities are responsible. Can the universities now help to produce the wisdom needed? The answer will not come from universities alone, for governments, businesses, primary and secondary schools, churches, indeed all the institutions of culture are participants in the answer. But universities set the pace intellectually; they educate today the leaders of tomorrow who will answer this question.

So we must face the challenges of environmental ethics, realizing how these are challenges to liberal education in the arts and sciences. Is the university prepared to meet this challenge? What is the role of the university in gaining the vision of one world where humans are in harmony with nature? What does the university have to teach about nature? What does the university have to learn about nature? To learn from nature? To learn and teach about appropriate respect for life on this home planet? That is not merely an assignment for the sciences; it is a challenge to the humanities.

"I'm a lover of learning, and trees and country places won't teach me anything, whereas people in the city do."[4] Socrates loved the city with its agora, gymnasia, politics, and culture, but he avoided nature as profitless and boring. On the other hand, when John Muir finished his formal education and turned to live in the Sierra Nevadas, he wrote, "I was only leaving one university for another, The Wisconsin University for the University of the Wilderness."[5] No education is complete until one has a concept of nature, and no ethics is complete until

one has an appropriate respect for fauna, flora, landscapes, and ecosystems. Universities love learning; universities love people and strive to make and keep life human. But, in an environmental ethics, life cannot be made and kept human unless it knows its place, the human residence on this home planet.

Such learning will, in part, expand what we have so far learned, a love of nature to complement our love of humans. That is a matter of repairing shortcomings in university education. But it will, in equal part, require us to unlearn what we thought we had learned. For education in the modern world has been designed to further the conquest of nature and the industrialization of the planet. Education has separated, alienated persons from nature. It has not produced a sustainable society. University learning has powered human success—an overdevelopment in which a good thing turns into a bad thing. We think of the universities as being the scene of an explosion of knowledge over the decades of this century. We think that knowledge is power. But if this explosion of knowledge and its resulting empowerment has produced a planet in crisis, perhaps the genius of the university is not what we thought. Our knowledge has not made us better fitted for life on the planet; it has made us misfits—so misfitted that our survival is at stake. If so, we need a new vision of responsibility.

RIGHTS AND CULTURE

Universities defend the *humanum,* the values carried by the human genius, those characteristics that make for human excellence, the arts and sciences by which humans are distinguished from the animal world. Universities transmit the heritage of culture, without which we cannot be human. They teach humans the art of living well; the sciences by which we understand the world. Animals have neither arts nor sciences; the particular virtue of Homo sapiens, the wise species, is this transmissible knowledge, this wisdom by which human life continues and flourishes. Universities guard our humanity. So it can first be thought that the role of the university is to protect human values at stake in the crisis on the home planet. What better way is there to do this than to speak out for human integrity and dignity, all those virtues cherished by the university, virtues that defend

what is right for humans, what is the human right? So perhaps the way to an Earth ethics is to defend human rights?

Ethics in the West developed long before modern biology, and even afterward has remained relatively autonomous, owing to a conviction that one commits the "naturalistic fallacy" to try to derive ethics from biology. Such humanistic ethics has recently come to place much weight on "rights." Since its origin in the mists of the past, ethics has meant choosing "right" against wrong. But "rights." a plural noun, is a recent way of conceptualizing certain human values. We protect those values by calling them "rights," privileges and possessions of humans in culture, which it is not "right" to be deprived of. Rights is a way of celebrating and guarding what is essentially human. But, in the very separation of ethics from biology, we shall have to wonder whether rights, celebrating the human, can help us to treasure the natural.

Such "rights" belong mostly in the heritage of Western culture; the idea is not well developed in ancient, preliterate, or Oriental cultures. There is nothing about rights in the Bible or in Plato and Aristotle. Still, "rights" has been an important Western ethical discovery, or invention. The universities have been champions of human rights. Such rights typically involve some human good at slake owing to the behavior of other humans. Rights can vary in kind; some are inalienable, at the core of human well-being; some can be bought and sold; some can be forfeited by wrong behavior; some cannot. Some are legal rights: privileges and possessions that persons have by virtue of their citizenship, and, where denied, these can be claimed by due process of law. Some are moral rights: claims made about goods universal to human persons, regardless of their citizenship. A citizen has a legal right to vote. Innocent persons have a right not to be killed, no matter whether they have court access. By moral and often legal right, persons have a right to an education, sufficiently at least to be functional in their societies.

Moral rights are sometimes said to be "natural" rights—not that they can be discovered by studying nature from a scientific point of view but that they arise from the character of human nature. They lie at the root of our well-being. They are not conventional by action of legislature or law court; they are intrinsic to the nature of personhood. Moral rights are the basis of what legal rights ought to be; and

we often appeal to moral rights where legal rights fall short, for instance where national sovereignties violate human rights or where there are no national sovereignties.

"Rights" protect certain human values thought especially important. Some of these we enjoy by way of culture, others by nature. "Rights" issues arise when such values need to be protected against the incursions of other humans. Everything human occurs, as Catherine Larrère (this volume) reminds us, in the cultural environment of humans interrelating with other humans. "Man is by nature a political animal," said Aristotle—the animal who builds and inhabits a "polis," a city.[6] Man is genetically an animal but specifically a citizen; that is the *differentia* that identifies the human essence. Hence we expect that ethics will arise to govern conduct in the "polis," channeling, orienting behavior to protect the goods of human nature and culture. We expect the universities to be at the front of such effort. What the universities will do is produce cultured citizens, who respect each other's rights, and where this happens, there will be harmony between persons. But will there be, by these rights, harmony between people and nature?

HUMAN RIGHTS TO NATURE

Asking about human rights, we can readily say that humans have a "right" to an environment that is healthy, that has its integrity. Such a right has not figured in the heritage of our past; there will be little written about it in the great university libraries of the world. Nevertheless, the academy can now speak out for this human right. For, evidently, humans are helped or hurt by the condition of their environment, and if humans have a right to life, liberty, and the pursuit of happiness, then they have a right to the natural conditions that are necessary to produce it. This includes the basic natural givens—air, soil, water, functioning ecosystems, hydrologic cycles, and so on. It may also include the environmental amenities—wildlife and wildflowers, scenic views, access to natural areas—since well-being includes amenities as well as essential natural resources. Such a "right to nature" is a right within culture, that is, it is a claim we can make against intrusions made by other humans where these put a healthy

environment in jeopardy Aggregating these claims at the global level, we might say that we humans have a right to this home planet.

We have discovered of late there is one more domain where humans have fundamental values at stake, always present but only recently consciously appreciated, a domain so threatened that it must come under political protection. The 1948 text of the *Universal Declaration of Human Rights* contains nothing on the natural environment.[7] The 1972 U.N. Conference on the Human Environment, in Stockholm, sought to delineate the "rights* of the human family to a healthy and productive environment. The World Commission on Environment and Development has declared that "All human beings have the fundamental right to an environment adequate for their health and well-being."[8] *The* United Nations Commission on Human Rights, through its Sub-Commission on Prevention of Discrimination and Protection of Minorities, has under way a study on human rights and their application to environmental problems. In nations revising their constitutions, the right to nature ought to be a constitutional right. The universities of the world by their research and advocacy can facilitate this process.

We must notice, anticipating the analysis to follow, that this does not mean that humans have some kind of claim against Mother Nature, for nature is no moral agent. We cannot lay claims against nature, any more than we can against grizzly bears or wildflowers, rivers or mountains. There is no right to be claimed against nature for these processes and products. Nature is prolific but not responsible. In fact, if we leave the *humanum* and turn to nature, to nature as it is independently of the human presence, what then? Such a nature preceded and yet surrounds us; it is also our human environment. But there things change—dramatically.

RIGHTS AND NATURE

What follows is a series of anomalies that cumulatively build toward a paradigm overthrow. The first anomaly occurs when we ask about our responsibilities for animal life and try to extend the concept of rights to animals. The concept that has worked so well to enlighten us about human dignity in the West fails to enlighten us about our duties to the fauna. Continuing the anomalies, we shall find that our intellectual

and moral education in the West ill equips us to value the flora, or species, or ecosystems, or to rise to an Earth ethics. We shall find that our political orders tend to fragment rather than unify us for a global environmental ethics. The challenge to contemporary education is competent evaluation of the natural world.

Consider, first, rights in nature. Although we humans may have a right to the natural environment, in that natural environment there are no rights at all, because in wild nature there is no *humanum.* There were no rights over the millennia of evolutionary time—nor are there today, outside the human sector. In the wilderness the mountain lion is not violating the rights of the deer he slays. Even the lioness who eats a human is not guilty of reprehensible behavior, for which she can be brought into court. The mountain lion can establish no relationships outside wild nature. Meanwhile, human beings do have a right to be protected from mountain lion predation and rescued when attacked, in their relationships to other humans. Rights go with legitimate claims and entitlements; but there are no titles or laws that can be transgressed in the wild. Rights go with appeals to moral agents who ought to protect certain human values. Nature is amoral, though perhaps valuable.

Wildflowers do not have rights nor can they recognize the rights of others. They do not have responsibilities. Nor do rivers and canyons, clouds and mountains. All this is comedy, because in nature the concept of rights is an inappropriate category. Aldo Leopold did say, "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land. ... A land ethic of course cannot prevent the alteration, management, and use of these 'resources,' but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state." They "should continue as a matter of biotic right."[9] But he is pleading for an appropriate human behavior, he does not mean that rights is a matter of their biology. He is groping to claim that their biological existence confronts humans with a value that it is not right for humans always to destroy. We have frankly to face the fact that there are no rights in nature. Perhaps they are generated when humans arrive and confront biotic nature.

We are beginning to see the challenge of environmental ethics to liberal education. There is a dramatic change when one moves from

the university to wild nature. At the university everything is human; everything is humane. In wild nature nothing is human, nor humane. The university defends human rights, but in the processes of nature there are no rights at all.

ANIMAL RIGHTS AND WELFARE

Or are there? Perhaps we are too quick to limit rights to those kinds of beings who can be schooled in culture. Perhaps animals have rights and the university can defend these? Charles 3. Elton, an ecologist, reports a belief that he himself shares, "There are millions of people in the world who think that animals have a right to exist and be left alone."[10] Arne Naess, a philosopher, says of animals that "in principle each of them have the same right to live and blossom as we and our children have.[11] In the United States over the last two decades, for instance, there is hardly a university that has not instituted an animal welfare committee, screening the uses of animals that the university permits. There is hardly a university on the campus of which there have not been protests and demonstrations against uses of animals. There is hardly a university that has not introduced a vegetarian alternative into its food services. Perhaps what we have now to learn is that the rights of humans is not all that the universities have to defend; they have to defend the rights of animals.

But whether or not animals have rights that we ought to defend is a challenging question. We still have under debate an appropriate ethic for animals, even though there is widespread conviction that many of our uses of animals have been immoral. The problem with animal "rights" is that, if we try to apply it to all the ranges of animal life, the concept grows tenuous. What happens is similar to the degeneration of other concepts that work well at the human level and fade over a descending phylogenetic spectrum—what it means to be "conscious" or "aware," to "deliberate," to undergo "experience," to have "interests" and "needs," even what it means to "suffer."

We speak with some plausibility of the "mammal rights" of chimpanzees and dolphins but with difficulty of those of birds or of snakes and perhaps not at all of any in oysters and insects. Moving down the spectrum (the species) of animal being, the concept of rights translates from human affairs to human-animal relations less and less well.

We begin to ask whether this is a logical difficulty, a matter of cultural conditioning, a habit of language? Or does it reflect attenuating value in organisms? A connection of rights with human-allied kinds of experience? These are challenging questions, on which we need help, and what can we learn from the philosophers, the ethicists, the ethologists, the zoologists? What disciplines of the university can help us to answer the question of appropriate respect for animal welfare?

Perhaps we should not arbitrarily restrict rights to persons? Still, animal rights are not natural in the sense that they exist in spontaneous nature. There is nothing about animal rights in zoology textbooks. Meanwhile, by constructing the concepts of rights, Western ethicists discover a way to protect values naturally present in persons. University faculty of every discipline will, each and every one, champion human rights, zoologists as quickly as philosophers. So rights seem to be there when (Western?) persons come on the scene and gone when persons are gone. But animal rights? Perhaps rights are generated by the encounter of moral agents with sentient life? So rights, clearly present in (or assigned to) persons, should also be found (or assigned) when persons encounter higher sentient animals.

But such rights would only be seminatural, not natural in the sense that they exist in wild nature; they would be cultural products. Such rights would emerge only when humans intervene in ecosystems. Such an intervention-generated right would be stronger than a legal right, binding independently of law, but not natural. Humans must sometimes affect sentient life adversely, they may sometimes affect it beneficially, and when we do either, we might say that some animals gain a right, otherwise unknown in nature, to flourish in their own way. There would be no rights for animals in wild nature; but animals in pens in laboratories on university campuses would have rights, rights that arise because they are in encounter with researchers.

Or is there a better way to conceive of the value of animal life than to use the vocabulary of rights? To say, "X has rights" seems like a statement of fact. But it is really a valuation, embedding a prescription, claiming to have located value in the possessor of rights. There are no rights present in the wild before humans arrive. But values—interests, desires, needs satisfied, a welfare at stake—are there apart from the human presence. It is really more "natural" to say that animals have goods (or, more technically, utilities). Goods do exist in wild nature,

while rights do not. The goods of sentient animals are best examined with a concept of health, or interests satisfied, or welfare.

But if that is so, perhaps what we realty want is a vocabulary of value. Animals enjoy values intrinsic to themselves, and, when humans arrive, appropriate respect for those values generates an ethics. "Rights" is a noun and can look like the name for something that an animal or a human has, in addition to hair, teeth, skills. But there is no reference to anything biologically present; a right is more like a person's having "money" or "status," that is, these things are subjectively, sociologically real, used to protect values that are inseparably entwined with personality. We might try to stretch such rights and project them out of culture onto wild nature. But this does not work convincingly if we move far from analogical contests. The concept breaks down because nature is not culture.

By contrast, "right" is an adjective, used to name forms of behavior engaged in by moral agents. All that "rights" (the noun) really does is state some of the claims about "right" behavior. Environmental ethics uses "rights" more as a term of convenience; the real convictions here are about what is "right." The issues soon revert to evaluations of right behavior, and we are better advised to dispense with the noun, rights, since this is not something that attaches to animals in the wild. We should use only the adjective, right, arising when moral agents encounter nature and find something valuable there. The ethics arises when the moral agent arrives, but the value was there before. It is sometimes convenient rhetorically but in principle unnecessary to use the concept of rights at all.

PLANTS AND NATURAL VALUE

But it is not simply animals on campus, animals used in culture, or even animals in the wild that we arc concerned about. Even if we find an account of moral obligation for animal welfare, taking care of that anomaly, most of the natural environment still remains unaccounted for. Taking a cue from the protecting of values, rather than the protecting of rights, we need to ask about larger responsibilities for protecting natural values. We are answerable for the values that we ourselves may threaten. Also, our responsibilities can tell us what we do not have a right to do.

In environmental ethics, moral agents confront valuable nonhumans who have neither moral rights nor moral responsibilities. But we humans do have responsibilities in encounter with these natural values, because one ought to respect value wherever it is found, including value at levels of being that are not human and therefore incapable of carrying either rights or responsibilities.

At this point, however, the universities, which we before found troubled by the question whether animals have rights, are even more troubled about whether there can be values in a wider class of nonhuman beings. No one doubts, of course, that the animals and plants, the rivers and forests, can be valuable resources for human life. Nature can be instrumentally valuable. My university, for instance, has an entire "College of Natural Resources," and almost all of the funding for natural science is given with a view to the beneficial applications that may result from such university research. The university champions the liberal arts *and sciences,* because the sciences liberate us as much as do the arts. They give us knowledge *(epistêmê)* and technical skills *(technê)* by which we can have dominion over nature.

But whether nature has instrumental value is not the question challenging us here. The question is whether natural kinds have a good of their own. The university has not found this question easy to answer. The phytophyla certainly do not manifest the values that the university prizes: they do not reason, they do not argue, they have no self-conscious reflection, nor are they autonomous selves. They cannot be educated. They are not even sentient; so what is of value in dumb plants?

In fact, there is a considerable presumption at least in the universities of the modern, scientific West, that all of nature is value-free. Take, for example, the conclusion of William James, eminent Harvard philosopher, who, early in our century, set the orientation that has characterized so much of the twentieth century. In an influential and representative statement, James portrays an utterly valueless world, with value appearing only when humans arrive:

> Conceive yourself, if possible, suddenly stripped of all the emotion with which your world now inspires you, and try to imagine it *as it exists,* purely by itself, without your favorable or unfavorable, hopeful or apprehensive comment. It will be almost impossible for you to realize such a condition of negativity and

> deadness. No one portion of the universe would then have importance beyond another; and the whole collection of its things and series of its events would be without significance, character, expression, or perspective. Whatever of value, interest, or meaning our respective worlds may appear imbued with are thus pure gifts of the spectator's mind.[12]

The universe is without value, except as humans come on the scene? That is a legacy that the universities have to overcome; and overcoming it requires a paradigm change about value. An insensate organism has no value on its own? Despite Socrates' dislike of trees, philosophers once knew better. But modern philosophers have forgotten what their classical predecessors knew. And what the philosophers forgot, the botanists should have been able to rediscover for them. Although we shall find nothing about biotic rights in botany textbooks, we shall find a great deal about survival value. Plants defend their lives; much is valuable to them for their survival.

A plant is not a valuer with preferences that can be satisfied or frustrated. It seems odd to claim that plants need our sympathy, odd to ask that we should consider their point of view. They have no subjective life, only objective life. But, though nothing matters to a tree, much is vital. An organism is a spontaneous, self-maintaining system, sustaining and reproducing itself, executing its program, checking performance by means of responsive capacities with which to measure success. Plants are unified entities of the botanical, though not of the zoological, kind. That is, they are not unitary organisms highly integrated with centered neural control, but they are modular organisms, with a meristem that can repeatedly and indefinitely produce new vegetative modules, additional stem nodes and leaves when there is available space and resources, as well as new reproductive modules—fruits and seeds—that contain the DMA coding to organize more of their kind.

A botanical organism is partly a special kind of cause and effect system and partly something more: a historical information system with a genetic coding that enables it to cope, to make a way through the world. In this sense, the genome is a set of conservation molecules. Given a chance, these molecules seek organic self-expression. With this a plant, unlike an inert rock, claims the environment as source

and sink, from which to abstract energy and materials and into which to excrete them. An acorn becomes an oak; the oak stands on its own.

So far we have only botanical description. We pass to philosophical value when we recognize that the genetic set is a normative set; it distinguishes between what is and what ought to be. This does not mean that the organism is a moral system. But the organism *is* an axiological, evaluative system. So the oak grows, reproduces, repairs its wounds, and resists death. The physical state that the organism seeks, idealized in its programmatic form, is a valued state. Value is present in this achievement. 'Vital' seems a better word for it than 'biological'. A life is defended for what it is in itself. Every organism has a good-of-its-kind; it defends its own kind as a good kind.

When humans encounter a living organism, they become responsible for their behavior. A moral agent, deciding his or her behavior, ought to take account of the consequences for other evaluative systems. We do have a responsibility to protect values, where they are present and at jeopardy by our behavior. Of course, given our own biological needs, humans must eat. Humans too have to make a way through the world, and this requires capturing values present in other organisms. We do so not only as biological agents but as moral agents. We have, if you like, a right to eat; but we have a responsibility to respect the vitalities of the organisms around us.

Meanwhile, the whole question of value in the natural world requires an unprecedented mixing of biology and philosophy, of science and conscience, a mixing that the university disciplines, especially in the light of the legacy of a value-free nature, are not yet well prepared to undertake.

ENDANGERED SPECIES

At the species level, responsibilities increase. So does the intellectual challenge of defending duties to species. The problem is partly scientific, one to be answered by the biologists. What are species? The problem is partly ethical, one to be answered by the philosophers. What duties have we to species?

Scientists find it difficult to say what a species is. They often incline to say that a species is merely an arbitrary classification, like the lines of latitude and longitude. Darwin, the father of modern biology,

wrote, "I look at the term 'species,' as one arbitrarily given for the sake of convenience to a set of individuals closely resembling each other."[13] When A. J. Shaw recently "discovered" a new species of moss, *Pohlia tundrae,* in the alpine Rocky Mountains, he did not find any hitherto unknown plants, he just regrouped herbarium material in the cabinets of the university herbaria that had been known for decades under other names.[14] Indeed, biologists routinely put after a species the name of the "author" who, they say, "erected" the taxon. So it can sound like species are just decisions made by systematists at the universities, who make them up this way or that. If so, there can hardly be a duty to endangered species.

Fortunately, other biologists have a better and more plausible answer. G. G. Simpson of Yale University, among the best paleontologists of the century, concludes: "An evolutionary species is a lineage (an ancestral-descendant sequence of populations) evolving separately from others and with its own unitary evolutionary role and tendencies."[15] Ernst Mayr, of Harvard University, holds that "species are groups of interbreeding natural populations that are reproductively isolated from other such groups." He can even emphasize that *"species are the real units of evolution,* they are the entities which specialize, which become adapted, or which shift their adaptation."[16]

Niles Eldredge and Joel Cracraft find that "A species is a diagnosable cluster of individuals within which there is a parental pattern of ancestry and descent, beyond which there is not, and which exhibits a pattern of phylogenetic ancestry and descent among units of like kind." Species, they insist, are *"discrete entities in time as well as space."*[17] The claim that there are specific forms of life historically maintained in their environments over time does not seem arbitrary or fictitious at all but, rather, as certain as anything else we believe about the empirical world, even though at times scientists revise the theories and taxa with which they map these forms.

So, in answer to the question, What are species?, we may at least confidently answer, Species exist; they are as real as individual plants or animals. Species are specific forms of life historically maintained in their environments over time. The individual represents—re-presents—a species in each new generation. It is a token of a type, and the type is more important than the token. Now the philosophers can begin to answer their question, What duties can there be to species? A

species lacks moral agency, reflective self-awareness, sentience, or organic individuality. A species has no self. But there is a biological identity reasserted genetically over time. The life that the individual has is something passing through the individual as much as something it intrinsically possesses, and a respect for life finds it appropriate to attach duty dynamically to the specific form of life.

The species line is the dynamic living system, the whole, of which individual organisms are the essential parts. The species too has its integrity, its individuality, its "right to life" (if we must use the rhetoric of rights); and it is more important to protect this vitality than to protect individual integrity. The right to life, biologically speaking, is an adaptive fit that is right for life, that survives over millennia, and this generates at least a presumption that species are good and therefore that it is right for humans to let them be, to let them evolve. The appropriate survival unit is the appropriate level of moral concern.

A shutdown of the life stream on Earth is the most destructive event possible. The wrong that humans are doing, or allowing to happen through carelessness, is stopping the historical vitality of life. Every extinction is an incremental decay in this stopping of life, no small thing. "Ought species X to exist?" is a distributive increment in the collective question, "Ought life on Earth to exist?" Since life on Earth is an aggregate of many species, when humans jeopardize species the burden of proof lies with those who wish deliberately to extinguish a species and simultaneously to care for life on Earth. One form of life has never endangered so many others. Never before has this level of question been deliberately faced. Humans have more understanding than ever of the natural world they inhabit, of the speciating processes, more predictive power to foresee the intended and unintended results of their actions, and more power to reverse the undesirable consequences. Such knowledge has come from universities. Can the universities also provide the wisdom needed to accompany such power and knowledge? At this point, all biology ought to become conservation biology, committed to optimizing the values carried by species. The responsibilities that such power and vision generate no longer attach simply to individuals or persons but are emerging duties to specific forms of life. What is required is principled responsibility to the biospheric Earth.

Educating such responsibility in the next generation is the role of the universities, although, few universities have ever raised the question of duties to species, much less answered it. But now such duty is becoming clearer. Indeed it is urgent. If, in this world of uncertain moral convictions, it makes any sense to claim that one ought not to kill individuals, without justification, it makes more sense to claim that one ought not to kill the species, without extraordinary justification. Several billion years worth of creative toil, many millions of species of teeming life, have been handed over to the care of this late-coming species in which mind has flowered and morals have emerged. Life on Earth is a many splendored thing; extinction dims its luster. From here onward, no one can claim to be educated, unless he or she knows that and acts accordingly.

ECOSYSTEMS AND A LAND ETHIC

We have been traveling into progressively less familiar ethical terrain, starting with humans, to whom humans have familiar duties, whose rights we indisputably must protect, and moving to consider higher animals, lower animal and plant organisms, and species. Duties to species began to open out toward duties to the speciating process and the supporting ecosystem in which species live and move and have their being. This includes *Homo sapiens* who, though a cultural animal, also lives in ecosystems. Ecosystems are ultimately our home, from which 'ecology' is derived (Greek: *oikos*, house). We need a logic and ethic for Earth with its family of fife. Can universities help to form this deeper ethic? Can they help us to value ecosystem communities both as our home and intrinsically— for what they are in themselves?

Environmental ethics claims that with ecosystems responsibilities continue to rise. "A thing is right," urged Aldo Leopold, "when it tends to preserve the integrity, stability, and beauty of the biotic community; it is wrong when it tends otherwise."[18] But ecosystems are unfamiliar moral territory. It is difficult to get the biology right and, superimposed on the biology, difficult to get the ethics right. Fortunately, that human welfare depends on ecosystemic support is , often evident. All our legislation about clean air, clean water, soil conservation, national and state forest policy, pollution controls, renewable resources, and so forth is concerned about ecosystem-level

processes. Further, humans find much of value in preserving wild ecosystems, for instance in our wilderness and park systems and our biological reserves. Still, a comprehensive environmental ethics needs the best naturalistic reasons, as well as the good humanistic ones, for respecting ecosystems.

As with species before, we have here a scientific question mixed with an ethical one. What are ecosystems? Only after answering that question can we ask whether there is value there, whether humans can have duties to ecosystems. An answer requires a seminal mix of biology and ethics, an understanding of what ecosystems are as well as a judgment that humans ought to preserve them. We need an accurate description of ecosystems and an informed prescription for conduct. We have to make clear, both in science and in ethics, a paradigm of community. Ecology discovers what is taking place in ecosystems, what biotic community means. Crossing over from science to ethics, we can discover the values in such community-systems and our human duties toward them.

Ecologists have themselves had differing opinions about ecosystems. "The plant formation is an organic unit … a complex organism."[19] So Frederic Clements, a founder of ecology, concluded from his studies of plant associations in the Nebraska grasslands. But Henry Gleason, a botanist of equal rank, protested, "Far from being an organism, an association is merely the fortuitous juxtaposition of plants."[20] On the one view, an ecosystem is rather like an organism; on the other, an ecosystem is only an accidental association of plants—little more than stochastic processes. A seashore, a tundra is a loose collection of externally related parts, hardly a community. It can begin to seem as if concern for ecosystems is secondary, instrumental to a respect for human and nonhuman life. An ecosystem is too low a level of organization to be the direct focus of concern. Or perhaps there is some other concept of biotic community—some sort of real natural unit, a level of organization above its individual member organisms. What description is plausible? Do prescriptions follow?

The debate among the biologists has, understandably, confused the philosophers. For there can be no obligations to an accidental jumble of organisms. That would be even more absurd than duties to species as arbitrary conventions. John Passmore, a philosopher entering the

argument, thinks that only paradigmatic human communities generate obligations:

> Ecologically, no doubt, men do form a community with plants, animals, soil, in the sense that a particular life-cycle will involve all four of them. But if it is essential to a community that the members of it have common interests and recognize mutual obligations, then men, plants, animals, and soil do *not* form a community. Bacteria and men do not recognize mutual obligations, nor do they have common interests. In the only sense in which belonging to a community generates ethical obligations, they do not belong to the same community.[21]

Passmore is assuming that the members of a morally bound community must recognize reciprocal obligations. If the only communal belonging that generates obligations is this social sense, involving mutual recognition of interests, then the human community is the sole matrix of morality, and the case is closed. Donald H. Regan, another philosopher, agrees: "Community—in the only sense in which it can possibly have any moral significance—requires at least the potential for shared beliefs and values. The universe of living creatures simply does not amount to a community in any morally relevant sense."[22]

So unless we can find a revised concept of biotic community and a revised concept of what duties can be toward, there will be no duties to ecosystems. Ecosystems are one of the great discoveries of our century, not so much by scientists working in university laboratories as by scientists working out of doors. Much biology has been pursued under the microscope, and we arc justly proud of the discoveries of molecular biology. But we cannot forget that all the microscopic structures, the DNA coding, the proteins with the structures and functions, are all for the sake of coping in the big scale ecosystemic world. Life takes place as organisms move through their worlds, inhabiting a niche in an ecosystem, as surely as it does in the cellular organelles and their biochemistries.

A gene is always emplaced in an organism that is emplaced in an ecosystem. The molecular configurations of DNA are what they are because they record the story of a particular form of life in the macroscopic, historical ecosystem. What is generated arises from molecular

mutations, but what survives is selected for adaptive fit in an ecosystem. We cannot make sense of molecular life without understanding ecosystemic life. The one level is as vital as the other.

Are ecosystems real? Yes. As real as Earth itself. Those who hold that organisms, or their biochemical molecules, are real, while ecosystems are just collections of interacting individuals, epiphenomenal aggregations, have fallen into confusion. Any level is real if there is significant downward causation. Thus the cell is real because that pattern shapes the behavior of amino acids, the organism is real because that pattern coordinates the behavior of hearts and lungs, and the ecosystem is real because the niche shapes the morphology and behavior of the members and parts within it. In that sense, ecosystems are as real as cells. For that conviction we are indebted to the great university ecologists of the twentieth century.

Still, their reality gives us grounds to ask whether ecosystems generate duties; it does not, by itself provide an answer. Unlike higher animals, ecosystems have no experiences; they do not and cannot care. Unlike plants, ecosystems have no genome. Unlike species, ecosystems have no ongoing organismic identity reinstantiated over time. Ecosystems can even sometimes seem to be jungles where the fittest survive, places of contest and conflict, or haphazard juxtaposition. But ecosystems are productive, vital systems. They produce and support, but they also limit, each kind—locking it into the welfare of others. Species increase their kind; but ecosystems have increased kinds, generated ever-richer communities. Hence the evolutionary toil, elaborating and diversifying the biota, that once began with zero species and results today in many millions of species—from protozoans to pupfish to people.

Biologists describe ecosystems as objectively interdependent communities where organismic needs are sufficiently satisfied for species long to survive, and philosophers ought to find that such ecosystems are satisfactory communities to which to attach duty. Our concern must be for the fundamental unit of survival. Ecosystems are the womb of life, the home community. They select for adaptive fit, they have generated over evolutionary time increasingly richer lives in quality and quantity, and continue now to support myriads of species and individuals, with higher levels of autonomy and experience at the top trophic levels. Human cultures emerge from Earth's ecosystems

and remain tethered to them. If such biotic communities are not admirable, satisfactory, and morally considerable, why not?

Ethical conservatives, in the humanist sense, will say that ecosystems are of value only because they contribute to human experiences. But that mistakes the last chapter for the whole story, one fruit for the whole plant. Humans count enough to have the right to flourish on Earth, but not so much that they have the right to degrade or shut down ecosystems, not at least without a burden of proof that there is an overriding cultural gain. The really conservative, radical view sees that the integrity, stability, and beauty of biotic communities is what is most fundamentally to be conserved. We are beginning to see that universities today are challenged to defend values that are much more comprehensive than simply the classical values of the academy.

A POLITICALLY FRAGMENTED EARTH

The challenges so far have asked whether universities are up to the task of defending value in the natural world. Have they an adequate concept of what sentient animals are and what duties are owed them, of what insentient organisms are and what baseline organismic values are to be protected? Can they make clear what a species is, what ecosystems are, and whether and why there are duties to such supra-organismic biological entities? Those assignments are all about the concept of nature. I now want to turn to an equally serious challenge facing universities, one in the cultural arena.

Superimposed on this morally deep world—with its fauna and flora, each reproducing after its kind, interacting in ecosystems, and with its planetary wholeness—is the world of human culture, the "polis." Alas, this is a politically fragmented world. There is one Earth, on it are 170 sovereign nations. The Brundtland Report begins, "The Earth is one but the world is not."[23] True, the one Earth is plural in its land masses and supports myriads of ecosystems, diverse species, diverse peoples. Still, the national sovereignties are not well adapted for harmonious relations with the Earth commons. The "rights" of nations and "rights" as claimed by citizens of these political states are not well aligned with the ecology and geography of the planet. In this century, the commons problem has become transnational; at the turn of the millennium it is becoming critical at global levels.

The challenge facing the world's universities thus is to criticize those dimensions of culture that fragment our harmony with nature, to envision alternative forms of culture that make possible the conservation of nature and the diverse social values that result from such conservation. Consider the problems of *natural* resources conceived of as *national* resources. Nationalizing natural resources may be part of the solution; it is equally part of the problem.

Many of Earth's natural resources, unevenly and inequitably distributed, have to flow across national boundaries if there is to be a stable community of nations. Consider the nations in relation to the hydrology of the planet. At least 214 river basins are multinational. About fifty countries have 75 percent or more of their total area falling within international river basins. An estimated 35 to 40 percent of the global population lives in multinational river basins. In Africa and Europe most river basins are multinational. The word "rival" comes from the Latin word for river, *rivus,* those who share flowing waters, With escalating population and pollution levels, sharing water has become increasingly an international issue. Nor is it any longer a matter of looking upstream and downstream. Shared water includes acid rain in Europe and North America. The pollutants produced in one nation often fall on—or flow into—another.

Flowing water is one of the unique features of this home planet, as the clouds and seas so evident in the space photographs reveal. The flow of water is a cultural resource that, however much modified by pipelines and pumps, remains inseparably part of natural meteorological and hydrological systems. Water is the most valuable natural resource on the planet; in contrast to the other planets, devoid of flowing water, water is what makes Earth the womb of life. Water is the principal resource that makes Earth right for life. When humans arrive, there arise "water rights," but these water rights ought not to be exercised in politically fragmented jurisdictions, unintelligently related to the hydrology of the landscape. We may buy and sell "water rights," but we must also use water in responsible harmony with natural systems. With water, one has to be a resident of Earth, not just a citizen in a city.

The shapes of the continents are the result of natural forces, and natural resources lie where they lie by nature. On these continents, national boundaries were drawn for political reasons and often with

minimal attention to natural resources. Nearly all these boundaries were drawn before many of the modern essential resources were resources at all—coal, uranium, copper, or aluminum ore, for example. Perhaps the single most valuable marketable natural resource is oil. But petroleum on Earth is highly concentrated; one quarter of the known reserves are in Saudi Arabia and more than half in the Middle East. The need for petroleum, however, is dispersed over nations around the globe. We might say that people have a right to petroleum; it is difficult nowadays to be either productive or free without it. But the divisions of nation-states, accidentally related to the location of this highly valuable natural resource, only compound the problem.

Modern nations—England or Japan, for instance—often have economies that require imports of natural resources and exports of manufactured goods. Indeed few, if any, nations are self-sufficient in all of the natural resources that they need or desire, and many are quite deficient. Wars result. People are fighting over what they think they have a right to; they are fighting as citizens of nations that have economic policies and political agendas. They want resources, but the political alignments can often mean suboptinial and unjust resource distributions.

In an Earth ethics that provides for a shared commons, the international fabric will have to be stable and dynamic enough so a nation that is not self-contained can contain itself within the network of international commerce. This involves living in a tension within a community of nations where there is access that redistributes resources across national lines sufficiently for nations to repair their own resource deficiencies in international trade. Unless such commerce can be arranged, the environment will suffer. Human rights to a decent environment, to their share of the world's resources and goods, will be denied. We are still looking for an ethic by which the global commons can be fairly shared in ways that make ecological sense. When nation-states arc politically operated as if geography and ecology were irrelevant, these will be disaster for both nations and nature. Such nations are essentially misfits on their landscapes.

A huge number of people are undernourished. People have a right to adequate food. Yet it is a recurrent pattern that, in the midst of starvation, there is food available either in the area hit, in neighboring territories, or in the global community at large. But for political or

economic reasons such food cannot flow to those who are hungry, and once again the social institutions thwart what could be a just distribution of the produce of an Earth commons. As a result of these social barriers, the environment will be further degraded by starving peoples, and the downward spiral continues.

The one Earth has no one government. Since sovereign nations are unwilling to cede any sovereignty to a world government, commons issues have to be negotiated in a political system where nations are defending the rights of their citizens, but the fragmented system prevents an integrated, global solution. In pollution cases, for example, the polluted nation, downwind or downstream, does not have any control over the polluter, upwind or upstream, while the polluter does not have any incentive to curb its pollution, since the damages are external to the nation. Cooperative action is difficult where there is little opportunity to regulate and police.

Keeping each nation oriented to global perspectives is a major role of the United Nations. Since the United Nations is not a sovereign state, its appeal must be largely persuasive, negotiatory, ethical—based on rights and responsibilities, more than on military force or political power. There are about 125 international agreements that deal directly with environmental problems. The United Nations Environment Programme played an important role in negotiations leading to the 1987 Montreal ozone protocol. The U.N. International Law Commission has been studying international liability and international watercourses, affecting environmental issues. The Third U.N. Conference on the Law of the Sea was significant. But national sovereignties have often tended to constrain the effectiveness of the United Nations as an advocate of the global commons. If the controlling interest is national sovereignty and welfare alone, we may be prevented from an Earth ethics by the fallacy of misplaced community. National sovereignties divide us when we need deeper solutions, respecting the larger communities of life on Earth.

Here the university community is—or can be and ought to be—transnational, international, global. Ideas need not stop at national boundaries; ideas can be exchanged freely when other resources cannot. Ideas are not consumed when used; they are not divided when shared. Ideas can sometimes fragment community, but the test of the best ideas is how they unify community. And the ideas we need are

visions and convictions of a global community that both is and ought to be—one world environmentally where there ought increasingly to be international community. Laws may stop at national boundary lines, but morality does not. Laws that cross national boundary lines can seldom be enforced on an unwilling nation; if there is to be compliance, moral persuasion is as important as political force.

This is a global vision; it requires resolving many questions about the entanglement of natural resources with national interests. Who has access to genetic resources and technology transfer? Who has a right to what, when valuable natural resources are exploited to make a profit? When resources are taken to be national possessions in dispute, it is difficult to find a fabric in which to share them. National rights obscure global responsibilities.

The Earth is one; its cultures are myriad. In a way, that is welcome; diversity is part of the richness of Earth. Cultural diversity is a good thing, just as natural diversity is a good thing. Many environmental problems are regional and do not need global solutions. But not always, and not in some critical eases. Diversity can be divisive. The myriads of cultures do not make it easy to reach common accord, even when such cultures have a common interest in maintaining the natural systems that support these cultures. Our national loyalties and cultural identities can assist in this, but they can just as often get in the way. The essential problem is that power is decentralized into national and subnational units—political units that may have little or no intelligent relationship to geography and ecology—while solutions are needed that integrate into systemic, global levels on a whole Earth. The operative values are fragmented, political, economic; the needed values are global, ethical, and ecological.

The view from space gives us that vision. It eliminates boundaries; Earth is a seamless dynamic whole. Two Arab astronauts sensed this expanding perception: "The first day we all pointed to our countries. The third or fourth day we were pointing to our continents. By the fifth day we were aware of only one Earth."[24] "From space I saw Earth—indescribably beautiful with the scars of national boundaries gone."[25] But that view from space has yet to be made operational when we come back down to Earth and defend our personal or national interests oblivious to our global responsibilities.

CITIZENSHIP AND RESIDENCE IN EARTH COMMUNITY

Once the mark of an educated person could be summed up as *civitas*, citizenship. People ought to be good citizens, productive in their communities, leaders in business, the professions, government, church, education. That was what the universities tried to produce: educated citizens. But the mark of an educated person is today, increasingly, something more. It is not enough to be a good "citizen," it is not enough even to be "international," because neither of those terms have enough "nature," enough "earthiness" in them. "Citizen" is only half the truth; the other half is that we are "residents" on landscapes. We are earthlings. Earth is our dwelling place. From here onward, there is no such thing as civic competence without ecological competence.

As Andrew Brennan notes (this volume), the graduates of universities in today's world are as likely to be part of the problem as part of the solution. Indeed, most of those leaders of government, commerce, and industry who urge unwise development, and who jeopardize our environment, have degrees after their names, sometimes a string of them. Substantial academic credentials do little to guarantee that a person maintains a sustainable relationship with the planet, much less an appropriate respect for nature. Often as not, the number of degrees is in inverse proportion to the degree of sustainability achieved. Many a citizen who is celebrated for his or her humanity is quite illiterate when it comes to reading the signs of the times boding ecological crisis. University graduates may know their duties to fellow citizens. But they are often, tragically enough, persons without a sense of responsibility to their native landscapes. They do not yet have a land ethic, an earth ethic.

Our responsibility to Earth might be thought the most remote of our responsibilities. It seems so grandiose and vague beside our concrete responsibilities to our children or next-door neighbors. But not so! Indeed, the other way around. It is the most fundamental of our responsibilities. Responsibilities increase proportionately to the level and value of the reality in jeopardy. We have already said that ecosystems are as real as species, as real as individual plant and animal organisms, as real as cells, or molecules, or atoms, because any level is real if it shapes the structure and behavior of its component parts. Moving up the scale of being to the global level, the highest level that we

humans have power to affect—the Earth—is the most real phenomenon of all, marvelously real. We can hardly be responsible to anything more cosmic—unless perhaps to God, if God exists.

Real community does not yet exist at world levels; nevertheless humans live on only one Earth and our powers operate at global ranges. An opportunity that we face from here onward, indeed a necessity thrust upon us, is to see Earth globally, to see ourselves as Earth residents with transnational interests. From the perspective of a nation-state, when we hear the word 'international,' we think at once of domestic and foreign. But with the word 'global,' there is no domestic and foreign, we are all natives. At that level, we are not citizens of a nation but residents. The animal who builds a *polis* still inhabits an *oikos,* a whole world. Humans have an ecology. We are incarnate in earth. We are Earth incarnate.

The natural and the cultural on Earth have entwined destinies. Across great reaches of geological time, there were no humans on Earth. Earth was entirely a natural system. Earth remains a vast natural system, as we see at once with the views from space. But for several thousand years Earth has increasingly supported cultural systems, and, in the last few centuries, these cultural systems have exploded. The great universities of the world have fueled that explosion. Today, everywhere, the resulting explosion of culture presses Earth's natural systems to their carrying capacities. In such situations, the myriad sovereign states can, as we have lamented already, make it difficult to cooperate.

But there is another side to the story. Just the threat to natural systems at the planetary level can produce consensus because now nations have a common interest that is entwined with the integrity of natural systems on the planet. The rights we claim have to be integrated with our responsibilities at the planetary level. The universities share the challenge of making that vision operational. The persons during whose lifetime the fate of the Earth will largely be decided are the generation of students in our universities today.

EARTH ETHICS

We are concluding that, beyond ecosystems, there is one level more, the global level. Environmental ethics is not over until we have an

Earth ethic. Future generations, animals, plants, species, ecosystems are progressively less familiar ethical territory, and an ethic for Earth itself may seem the oddest of all. Since everyone wishes a healthy environment, perhaps ethics can simply stay at our first focus: humans. A healthy global environment is requisite for healthy humans; this is their right. We are concerned with human well-being immediately and with environmental health instrumentally to that.

But can we really say that the only value displayed in the panorama of life—animals, organism, species, ecosystems—is that which is instrumental to human welfare? Ought not this sole moral species do something less self-interested than count all the produce of an evolutionary ecosystem as nothing but human resources? Such a provincial attitude hardly seems biologically informed, much less ethically adequate. It hardly seems the universal view that a university ought to advocate. To the contrary at this point, four hundred years after the Enlightenment that launched modern universities, we find that moral enlightenment still lies ahead.

We need an ethical vision where other things count that are outside the human circle. Perhaps humans should find a place in an encircling Earth? We may not want to say that animals, plants, species, ecosystems, or Earth have rights, but neither do we think humans have a right wantonly to destroy these valuable things. In an ethic of respect for life, the appropriate level of moral concern is the appropriate survival unit. The planet is that ultimate survival unit. Now we are beginning to get a change of reference frame. No longer does it seem that humans count alone, with everything tributary to them; humans count as residents on this majestic planet.

An earth ethics suggests an ethics about dirt. That is sometimes taken to be the ultimate *reductio ad absurdum* in environmental ethics: One would have to be an ultimately confused academic to maintain that we can have duties to dirt. A university professor who so maintains is not part of the solution but irrelevant to the problem. Put like that, I suppose, we have to agree. Dirt, earth (spelled with the lower case "e") has no intrinsic value nor do we have duties to it. Yet there is more to say, another logic that has different kinds of implication. This logic knows the implications, the unfoldings and the infoldings, of the logic of earth. For the biological implications of earth—and of Earth—are profound.

When we go from earth to Earth, from dirt to the prolific planetary system of which it is part, perspectives change. Dealing with an acre or two of real estate, perhaps even with hundreds or thousands of acres, we can think that it belongs to us and that its only value is instrumental to our preferences. Dealing with a nation-state, we think citizens should defend their territory and their goods. But on the global scale, Earth is not something we own. Earth docs not belong to us; rather we belong to it. We belong on it. The question is not of property but of propriety. The vision of human life we ought to seek is not that of maximum exploitation of Earth as a big property resource, not the defense of our territory; it is that of valued residence in a community of life.

In that sense, an Earth ethic is not the *reductio ad absurdum* of silly and peripheral concern about chipmunks and daisies, extrapolated to rocks and dirt. To the contrary, it is the elevation to ultimacy of an urgent world vision. It is the ultimate implication, the logical consequence of being alive on Earth. Perhaps there is a God above, and this marvelous living Earth may witness to that God, but meanwhile what cannot be doubted is that on this enthralling Earth we live and move and have our being. A century ago, a call for community was typically phrased as "the brotherhood of man and the fatherhood of God." Now, turning the millennium, for the twenty-first century such a call must be more ecological—and less patriarchal—a call for appropriate respect for this mother Earth, this womb out of which we come and which we never really leave. Such an ethic is not one more item to be added to an already long university agenda. On this home planet in crisis, it is *the* agenda. From here forward, a university education that is not environmental education is no education at all.

Summing up the prospects for a land ethic, Aldo Leopold lamented:

> Perhaps the most serious obstacle impeding the evolution of a land ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of land. Your true modern is separated from the land. ... He has no vital relation to it; to him it is the space between cities on which crops grow. … In short, land is something he has "outgrown" . . . Much higher education seems deliberately to avoid ecological concepts. An understanding of ecology does not necessarily originate in courses bearing ecological labels; it is quite

> as likely to be labeled geography, botany, history, or economics. That is as it should be, but whatever the label, ecological training is scarce. The case for a land ethic would appear hopeless but for the minority which is in obvious revolt against these "modem" trends.
>
> The key-log which much be moved to release the evolutionary process for an ethic is simply this: ... Examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. 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.[26]

In the half century since Leopold wrote, we have learned that the land ethic, in the end, has to be an earth ethic. But our universities have still to get education headed in the right direction.

CONCLUSION

It was feared by some that the space flights, reaching for the stars, was an act of human arrogance—*hubris* in extreme—more of the conquest and dominion that have already ravaged the planet. And such knowledge-become-power epitomized the know-how flowing out of our proud universities. But the haughty, the high, and the mighty failed to materialize with the flight into space. Rather humility—from *humus,* meaning "earthy" (which is also the root of 'human')—was the dominant experience. Perhaps that is the truth in the beatitude: "Blessed are the meek, for they shall inherit the Earth." The challenge to the university, after the knowledge and power it imparts from one generation to the next, is to educate this generation and the next into that meekness that can inherit the Earth. For Earth is indeed a planet with promise, a promised planet, and we humans have both the right to share in and the responsibility to help to keep that promise.

NOTES

1. Astronomer Fred Hoyle, quoted in Kevin W. Kelley, ed., *The Home Planet* (Reading, Mass.: Addison-Wesley, 1988), inside front cover.

2. Kelley, ed., *The Home Planet.*

3. Quoted in Kelley, at photographs 42-45.

4. Plato, *Phaedrus* 230d., trans. H. H. Fowler, *Plato,* vol. 1, Loeb Classical Library (Cambridge, Mass,: Harvard University Press, 1914, 1977), pp. 423-24.

5. John Muir, *The Story of My Boyhood and Youth* (Madison: University of Wisconsin Press, 1965), p. 228.

6. Aristotle, *Politics* 1,2. 1253[a].

7. The text was approved by the U.N. General Assembly on December 10, 1948—U.N. General Assembly, Third Session, First Part, *Official Records,* "Resolution," pp. 71-77.

8. *Environmental Protection and Sustainable Development: Legal Principles and Recommendations* (London/Dordrecht: Graham and Trotman/Martinus Nijhoff Publishers, 1987), p. 9. See also "Summary of Proposed Legal Principles for Environmental Protection and Sustainable Development Adopted by the WCED Experts Group on Environmental Law," in World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), pp. 348-51.

9. Aldo Leopold, *A Sand County Almanac* (New York: Oxford University Press, 1968), pp. 204, 211.

10. Charles S. Elton, *The Ecology of Invasions by Animals and Plants* (New York: Wiley, 1958), p. 143.

11. Arne Naess, "A Defense of the Deep Ecology Movement," *Environmental Ethics 6* (1984), p. 226.

12. William James, *The Varieties of Religious Experience* (New York: Longmans, Green, and Co., 1925), p. 150.

13. Charles Darwin, *The Origin of Species* (Baltimore: Penguin Books, 1968), p. 108.

14. A. J. Shaw, "*Pohlia andrewsii* and *P. tundrae, Two* New Arctic-Alpine Propaguliferous Species form North America," *Bryologist* 84 (1981): 65-74.

15. G. G. Simpson, *Principles of Animal Taxonomy* (New York: Columbia University Press, 1961), p. 153.

16. Ernst Mayr, *Principles of Systematic Zoology* (New York: McGraw-Hill, 1969), p. 26; "The Biological Meaning of Species," *Biological Journal of the Linnean Society* 1 (1960), p. 318.

17. Niles Eldredge and Joel Cracraft, *Phylogenetic Patterns and the Evolutionary Process* (New York: Columbia University Press, 1980), p. 92.
18. Leopold, *Sand County,* pp. 224-25.
19. F. E. Clements, *Research Methods in Ecology* (Lincoln, Neb.: University Publishing, 1905), p. 199.
20. H. A. Gleason, "Delving into the History of American Ecology," *Bulletin of the Ecological Society of America 56/4* (December 1975), p. 10.
21. John Passmore, *Man's Responsibility for Nature* (New York: Charles Scribner's Sons, 1974), p. 116.
22. Donald H. Regan, "Duties of Preservation," in Bryan G. Norton, ed., *The Preservation of Species* (Princeton, N.J.: Princeton University Press, 1986), pp. 195-220, citation on p. 198.
23. World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), p. 27.
24. Sultan Bin Salman al-Saud, from Saudi Arabia, in Kelley, *Home Planet,* at photograph 82.
25. Muhammed Ahmad Faris, from Syria, ibid., at photograph 76.
26. Leopold, *Sand County,* pp. 223-25.