

The Bible is not a book of science, and therefore not of ecology. It does, however, sketch a vision of human ecology, and contemporary readers encounter claims about how to value nature. The Bible's vision is simultaneously biocentric, anthropocentric, and theocentric. The Hebrews discovered who they were as they discovered where they were, and their scriptures can be a catalyst in our ecological crisis.

The Bible and Ecology

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The Bible and Science

CHRISTIANS AND JEWS do not turn to the Bible to learn natural science. Four centuries of developing modern science underscore what Galileo insisted with the launching of astronomy: The Bible teaches how to go to heaven, not how the heavens go. There is nothing there about black holes or astrophysics. That is also true with microphysics: neutrinos or quarks. This is true even with physics at ordinary ranges. Biblical writers never write equations such as ($D = 1/2at^2$), where the distance (D) a body falls is a function of the acceleration (a) due to gravity and time (t), but not of mass. They did not know that in a vacuum the feather and the rock fall and reach the ground together, but that in the field air friction skews this result. Likewise with chemistry, geology, meteorology, and all the physical sciences, Biblical writers were prescientific.

In the biological sciences, this conviction continues, though more problematically. Biblical writers did not know any cellular, much less molecular, biology, nothing about ribosomes or DNA. There is no genetics, nothing about meiosis, or recessive and dominant alleles. The Gospel writers could not have entertained the question whether Jesus was a haploid. Darwinian biology proved so upsetting just because some theologians did think they knew from the Bible how the cre-

ation had taken place; and it has taken a century to relax that conviction, rather similarly to the way, four hundred years before, it took a century to relax the conviction that theologians knew astronomy from scripture. Biblical writers did not know about natural selection; the surplus of offspring with genetic variation, the selection of the better adapted fits, and the dynamic, incremental evolution of life over millennia.

The Bible and Ecological Science

If we continue this line of argument, it would seem a mistake again to think that there is any knowledge of ecology in the Bible. The British Ecological Society surveyed their members to rank in order the fifty most important concepts in ecology.¹ On that list we find concepts such as the ecosystem, succession, the niche, habitats, food webs and trophic levels, carrying capacity, territoriality, key-stone species, energy flow, and life history strategies. None of these appears *as such* in the Bible. There is nothing about nutrient cycles or the Lotka-Volterra equations, which relate population size, the number of organisms that the environment will support, to time, growth rate, and carrying capacity. If so, is it the same with ecology as with astrophysics? Again, the Bible is not a science book. But then what could the Bible say that is of interest to our ecological concerns?

There is an important difference, however, between ecology and astrophysics, or microphysics, or cellular biology, or evolutionary biology. Ecology is a science at native range. Perhaps the biblical writers did not know how the heavens go, but they did know how the earth goes—not at planetary ranges, nor in soil chemistries—but at the pragmatic ranges of the sower who sows, waits for the seed to grow, and reaps the harvest. The Hebrews knew how to grow vineyards and olive trees; they knew how to prepare "wine to gladden the human heart, oil to make the face shine" (Ps. 104:15), although they did not know the bacteria of fermentation, much less had they any knowledge of unsaturated fats in the olive oil. They knew to let land lie fallow on sabbath. Abraham and Lot, and later Jacob and Esau, dispersed their flocks and herds because "the land could not support both of them living together" (Gen. 13:2-13; 36:6-8). The Hebrews worried about livestock trampling and polluting riparian zones (Gen. 29:1-8; Ezek. 34:17-19). Residents on landscapes live immersed in their native range ecology. We moderns, with our university degrees, might be too quick to think that the Hebrews knew no ecology.

Any science is an "abstraction," that is, it achieves its successes by a "pulling away" (*abs-traction*) from concrete reality. The scientist detects generalities in the particulars. The Lotka-Volterra equations (which formalize the problem of Abraham and Lot) take a part out of the whole, the lawlike or repetitively patterned aspect isolated out for the science, while in real nature law is mingled with the particulars of the local environment: the pastures "from the Negeb as

far as Bethel," and on to where Abraham's tent was pitched "between Bethel and Ai" (Gen. 13:3), on which these nomads realized they were trying to keep too many sheep and goats. Here the textbook ecologist is likely to be able to learn a great deal from any people indigenous to a landscape for centuries.

Ecology is a rather piecemeal science; the ecologists' comprehensive abstractions, their equations, are often not all that useful on the ground in local situations. There the specifics overwhelm the generalities, and the local resident figures out those details. Rural peoples in ancient Palestine might have been better in contact with nature than most biological academics, who sit in offices and laboratories. Even if ecologists go on field trips, they never have to gain a living from the land. Most biologists buy their food at Safeway; few cut their own fuelwood. They work in disciplines and they live lives that are abstracted from the landscape; the biblical writers lived intimately in their ecologies.

Ecology is about relations to nature. Wherever there are humans in relation to nature, such humans will have to cope, and they will succeed only insofar as they get it right, at least operationally, though perhaps not theoretically. If they have coped for millennia, there might be in their scriptures insights to which we moderns can turn. We are sobered by our ecological crisis, which evidences our inability to cope with our own relations to nature and natural resources.

Any such ecological wisdom, however, might not be peculiar to the Hebrews in Palestine, but as readily found with the Arunta in Australia on their kinds of landscapes, or with the Navajos in the American Southwest on their landscapes. This would be indigenous wisdom rather than divine revelation. Since it is embedded in regional geography and detail, it might or might not be transferable to the kinds of landscapes on which contemporary peoples find themselves in their ecological crises (the timber crisis in the Pacific Northwest, or acid rain in eastern Canada).

Also, sometimes these peoples needed facts about land health of which they were ignorant. Typically, the Mediterranean peoples understood their rainy winters and dry summers, and arranged their crops and grazing accordingly. But they did not understand the perils of irrigation, such as the gradual salinization of soils, and they either lucked out, as did the Egyptians, or lost out, as did the Babylonians; or they made do with natural rainfall, as mostly did the Hebrews. It is doubtful that the Canaanite peoples understood the differences between the character of valley soils, which are of greater depth, and the upland, shallow soils, which are derived from different rocks, which they terraced and treated as though they were valley soils, resulting in massive erosion.² Some Hebrews may have understood these problems where others did not; indigenous knowledge can be uneven. That they managed to cope does not always mean they understood well what was going on.

Also, very different worldviews can result in reasonably successful coping.

Consider the Taoists in ancient China, with their oscillating yang and yin. For an agricultural people, this picture seemed to get it right locally and by their lights. There is day and night; there are seasonal changes, summer and winter. There is sun and moon. The landscape has its mountains with their yang and valleys with their yin. South sides of mountains are drier (more yang); valleys are wetter (more yin). Plants have vital parts both above ground (more yang) and below ground (more yin). There is male and female; life has its growing and its recessive phases. The good life comes by following the Tao, by the balance of activism and passivism, by flowing with the natural. That worked in China for longer than the Hebrews inhabited Palestine. Some say that the Taoists were the original ecologists and that we need to recover their wisdom; others are not so sure.

The Hebrews do not take up such a view of polar complements as their fundamental interpretation of landscapes. They see their promised land, fertile and productive, as a gift from Yahweh. They do not obey Nature, Tao, but Torah, the commandments of God: "Happy are those ... [whose] delight is in the law of the Lord. ... They are like trees planted by streams of water, which yield their fruit in its season . . . The wicked are not so, but are like chaff that the wind drives away" (Ps. 1:1-3). The Hebrews interpret their crop failures owing to drought as divine wrath (Jer. 14), not as too much yang in the overly ambitious farmer. And neither of these paradigms—yang and yin or grace and judgment of Yahweh—is ever going to be among the fifty top concepts in ecological science. Beyond bits of indigenous wisdom here and there, what could be the relation between Bible and ecology?

The Bible and Human Values

Let us make a fresh start. The Bible is a book about how to live justly, not about how natural history works. The righteous life depicted there is not simply how to go to heaven, prominent as the kingdom of heaven is in the New Testament; the righteous life, especially in the Old Testament, is about a long life on earth, sustainable until the third and fourth generations. Still, the "how to go" aphorism better indicates what to expect. The Bible is about keeping this earthly life divine, godly, or at least human, humane, for which their code words are "righteous" and "loving." Any people who cope on a landscape for centuries will have some store of ecological wisdom, but that is not what we really turn to the Bible to learn. How *nature works* is the province of the physical and biological sciences. How *human nature* works is the province of the Bible, both how it does, and how it should, work.

The Bible is about a gap between what *is* and what *ought to be*, and how to close that gap. This often requires revealing how human nature fails to work, and how to re-form, or redeem this "fallen" nature. The biblical writers launched a struggle to discover this, and we continue in that struggle, enriched by interact-

ing with these ancient texts. We do not turn to ancient scriptures to learn modern science, but there might be classical insights into human character there, as vital today as they ever were. These are matters of faith and morals; such knowledge certainly takes vision, and may well have required divine inspiration. Such learning may require continued re-inspiration from these ancient sources.

Humans face a perennial challenge. We must get oriented with regard to values. We have to face ultimate questions. On these issues, science is not so knowledgeable, certainly not the physical and biological sciences, and religion comes to the fore. What it means to be blessed, what it means to be wicked: These are theological questions. Humans must repair their broken wills, discipline innate self-interest, and curb corrupt social forces. One is not going to get much help here from astrophysics, or microphysics, or chemistry, geology, or genetics, or cellular or molecular biology, or evolutionary history. Or ecology?

There really is no scientific guidance of life. After four centuries during which science has progressively illuminated us about the facts of nature, questions about values are, as we turn to face a new century, indeed a new millennium, as sharp and as painful as ever. The values surrounding the pursuit of science, as well as those that govern the uses to which science is put, are not generated out of science. Science can, and often does, serve noble interests. Science can, and often does, become self-serving, a means of perpetuating injustice, of violating human rights, of making war, of degrading the environment. Where science seeks to control, dominate, manipulate either persons or nature, or both, it blinds quite as much as it guides. Nothing in science ensures against philosophical confusions, against rationalizing, against mistaking evil for good, against loving the wrong gods. The whole scientific enterprise of the last four centuries could yet prove demonic, a Faustian bargain; and as good an indication of that as any is our ecological crisis.

The Bible and Human Ecology

Biblical writers did inhabit an ecology. But perhaps we ought not focus on the ecological *science* they might have known, but rather on the *human* ecology into which they had insight. Emphasize the *human*, not the *ecological side* of the relationship. We want to regain their insights into human nature more than their insights into nature. True, one cannot know the right way for humans to behave if one is ignorant of how human behaviors result in this or that causal outcome in the natural systems about which one is concerned—what (in our terms) is the carrying capacity of the Bethel-Ai rangeland, or whether letting the land lie fallow one year in seven is adequate to restore its productivity. At times the knowledge of biblical writers was possibly archaic and they did not have the right categories for interpreting nature.

Still, the Hebrews knew enough to know that they were given a blessing with

a mandate: "You must follow the path that the Lord your God has commanded you, so that you may live, and that it may go well with you, and that you may live long in the land that you are to possess. . . . Hear therefore, O Israel, and observe [these commandments] diligently, so that it may go well with you, and so that you may multiply greatly in a land flowing with milk and honey, as the Lord, the God of your fathers, has promised you" (Deut. 5:33; 6:3). That the land flows with milk and honey (assuming good land husbandry) has to be coupled with divine law, if there is to be a sustainable society.

The Hebrews knew enough to trust that there is in every seed and root a promise. Sowers sow, the seed grows secretly, and sowers return to reap their harvests. God sends rain on the just and unjust, and this is cause enough for praise. But, take care. The supporting ecology is not enough. There must be obedience to commandments (*tora*h, "instruction") by which people can flourish in the land. Maybe the Hebrews made mistakes about irrigation or soil erosion. But one needs little ecology to know that lands, irrigated or not, do not flow with milk and honey for all unless and until justice rolls down like waters. It is not the science but the ethics into which they have insight. Abraham said to Lot, "Let there be no strife between you and me, and between your herders and my herders" (Gen. 13:8), and they partitioned the common good equitably among themselves.

Alas, this often failed, "Let me sing for my beloved a love-song concerning his vineyard: My beloved had a vineyard on a very fertile hill. He dug it and cleared it of stones and planted it with choice vines; . . . he expected it to yield grapes, but it yielded wild grapes. . . . for the vineyard of the Lord of hosts is the house of Israel, and the people of Judah are his pleasant planting; he expected justice, but saw bloodshed; righteousness, but behold a cry! . . . Ah, you who join house to house, who add field to field, until there is room for no one but you, and you are left to live alone in the midst of the land" (Isa. 5:1-2, 7-8). The metaphor unpacks into the claim that there can be no intelligent human ecology except as people learn to use land justly and charitably.

Today eighty percent of the world's production is consumed by twenty percent of its peoples, and eighty percent of the world's population is reduced to living on the remaining twenty percent; there is strife between us about this, and environmental degradation a result, and what is the equitable thing to do? This is human ecology with a focus on ethics, not science. No ecological science can supply answers. Answers are not easy to come by even from the Hebrew and Christian scriptures, but they do proclaim, Genesis to Revelation, that justice and love are necessary parts of the answer.

The ecology of *x* is a matter of *x*'s being informed so that *x* can successfully live in that world. If *x* is an ostrich, we can consult ecology textbooks. But if *x* is *Homo sapiens*, we must also consult texts that describe both how humans do behave and prescribe how humans ought to behave. Unlike ostriches, humans have

to be moral to make their ecology work. Ecology is a logic of the whole that is a home (*eco-logos*), a logic of the self in relation to the whole. Humans are the creatures with a conscience, and they cannot live well in the land without loving God and neighbor.

In the metaphors of Psalm 23: The Lord leads to green pastures, beside still waters. Sheep need water and forage, and life is like that; and ecologists, ancient and modern, know this. Now lift this up into an archetype for human life. Water and forage is what pastoral peoples need, too; but they also have to be led in "right paths for his name's sake" (v. 3). Divinely given, earthen nature is the original act of grace, but this can be received only by a people disciplined as "your rod and your staff— they comfort me" (v. 4). Then, "surely goodness and mercy shall follow me all the days of my life, and I shall dwell in the house of the Lord my whole life long" (v. 6). There are valleys of deep darkness, but there is a vast earthen and spiritual providence that supports the righteous life. This is their "land ethic," and it is not something that one can learn any better in a book of ecological science, or even in Aldo Leopold's *Sand County Almanac*.³

The Bible and Natural Value

Knowledge of human ecology is necessary, perhaps sufficient for coping on landscapes. Knowledge of righteousness and grace is necessary, also sufficient for a good, long life (sustainable development) in a land flowing with milk and honey. But both are insufficient for fully knowing who we are and where we are. More objectively, humans must move to the nonhuman world, and the human relation to it. Biblical writers have an intense sense of the worth of creation, what we today would call its value. Nature is a wonderland. "Praise the Lord from the earth, you sea monsters and all deeps, fire and hail, snow and frost, stormy wind fulfilling his command! Mountains and all hills, fruit trees and all cedars! Wild animals and all cattle, creeping things and flying birds!" (Ps. 148:7-10). "You crown the year with your bounty; your wagon tracks overflow with richness. The pastures of the wilderness overflow, the hills gird themselves with joy, the meadows clothe themselves with flocks, the valleys deck themselves with grain, they shout and sing together for joy" (Ps. 65:11-13).

Science teaches us about astronomical and microscopic worlds that are beyond our ken without telescopes and microscopes; science takes us into deep time in evolutionary history or counts nanoseconds in nuclear physics. Still, science sooner or later has to come back to these native ranges that we inhabit. It has to save, to conserve the appearances. But then we have to evaluate those appearances, that is, these events evidently taking place at the middle-scale ranges where so much of the marvel, the complexity, the diversity of natural history lies. At this point, science, unaided, does not teach us what we most need to know about nature: how to value it.

Those deeply experienced in nature do not have to know modern science to take the word *genesis* seriously, even if their subsequent education in science can greatly enrich that experience. Encountering the vitality on their landscapes, the Hebrews formed a vision of creation, cast in the past, cast also in the rhythms they knew in the workaday week, a vision that gave account of the evident genesis that must once have put into place what they now encountered. The "days" (events) of creation are a series of divine imperatives that empower Earth with vitality. A prolific Earth generates teeming life. The brooding Spirit of God animates the Earth, and Earth gives birth. "The earth was without form and void, and darkness was upon the face of the deep; and the Spirit of God was moving over the face of the waters. And God said, 'Let there be . . .'" (Gen. 1:2-3). "Let the earth put forth vegetation." "Let the earth bring forth living creatures of every kind" (Gen. 1:11, 24). "Let the waters bring forth swarms of living creatures" (Gen. 1:20). "Swarms" is, we can say, the prescientific word for biodiversity. Earth speciates.

One can have a Ph.D. in science and not be able adequately to evaluate this spontaneous generation of swarming creatures. Scientists may take natural history as all value-free, as nothing but matter in motion, or all random, or all jungle red in tooth and claw, or just a resource to be exploited. Science per se is not particularly impressive at depth evaluations. But God, the Hebrews say, reviews this display of life, finds it "very good," and bids it continue. "Be fruitful and multiply and fill the waters in the seas, and let birds multiply on the earth" (Gen. 1:22). In current scientific vocabulary, there is dispersal, conservation by survival over generations, and niche saturation up to carrying capacity. After that, one has to go beyond science to say, "Amen, and so be it!"

The fauna is included within the covenant. "As for me, I am establishing my covenant with you and your descendants after you, and with every living creature that is with you, the birds, the domestic animals, and every animal of the earth with you" (Gen. 9:9-10). The fallow fields and vineyards, for example, were to be open to birds and beasts. In modern terms, the covenant was both ecumenical and ecological. It was less anthropocentric and more biocentric than modern Jews or Christians realize and most scientists are willing to tolerate.

Noah and his ark is the first "endangered species project." God wills for each species to continue, despite the disruptions introduced by humans. Although individual animals (and people!) perish catastrophically, God has (in the language of the *Endangered Species Act*) an "adequate concern and conservation" for species.⁴ After the Flood, God reestablishes "the covenant that I make between me and you and every living creature that is with you, for all future generations" (Gen. 9:12-13). Humans are to repopulate the earth, but not at threat to the species; rather, the bloodlines must be protected at threat of divine reckoning (Gen. 9:1-7). The biblical authors had no concept of genetic species but used instead the vocabulary of bloodlines. The prohibition against eating the

blood is a sign of respect for these bloodlines. The science is rather archaic, but the environmental policy ("Keep them alive with you," Gen. 6:19) is something the U.S. Congress reached only in 1973; regrettably, now a backsliding Congress is not at all sure that it wants to reauthorize such policy in 1995.

Noah's policy is not just to save those species that are of "esthetic, ecological, educational, historical, recreational and scientific value to the Nation and its people."⁵ He is commanded to save them all. These swarms of species are often useful to the Hebrew people, and on the ark clean species were given more protection than others. But Noah was not simply conserving global stock. Here man is not the measure of things. The story of Noah teaches sensitivity to forms of life and to the biological and theological forces producing them. What is required is not human prudence but principled responsibility to the biospheric Earth, to God.

The biblical tradition is culturally conditioned; the prescientific Hebrews constituted their world, and we scientific moderns constitute ours differently. When we confront their worldview, however, they challenge us to see what synthesis we can make for ourselves. The psalmist sings: "The trees of the Lord are watered abundantly, the cedars of Lebanon that he planted" (Ps. 104:16). Such forests invite transcending the human world and experiencing a comprehensive, embracing realm. Forests can serve as a more provocative, perennial sign of this than many of the traditional, often outworn, symbols devised by the churches, John Muir, recalling the psalmist, sings: "The forests of America, however slighted by man, must have been a great delight to God; for they were the best: he ever planted."⁶ Ecological science can help us to understand how and why these old growth forests were so well planted, but it can only bring us to the threshold of the psalmist's or Muir's praising God for their genesis.

The forests are a characteristic expression of the creative process, both presence and symbol of forces that transcend human powers and utility. The central "goods" of the biosphere—forests and sky, sunshine and rain, rivers and earth, the everlasting hills, the cycling seasons, wildflowers and wildlife, hydrologic cycles, photosynthesis, soil fertility, food chains, genetic codes, speciation and reproduction, succession and its resetting, life and death and life renewed—were in place long before humans arrived. The dynamics and structures organizing spontaneous nature do not come out of the human mind; a wild forest is something wholly other than civilization. It is presence and symbol of the timeless natural givens that support everything else. The Hebrews anciently received enough inspiration to detect this, though ecologists today are required to fill out the details. In this dialogue, both theologians and ecologists can be challenged by features in the world that neither group constitutes but that both are forced to evaluate.

Biology and theology are not always easy disciplines to join. One conviction

they do share is that the ecosystemic Earth is prolific. Seen from the side of biology, this is called speciation, biodiversity, selective pressures for adapted fit, maximizing offspring in the next generation, niche diversification, species packing, and carrying capacity. Seen from the side of theology, this trend toward diversity is a good thing, a godly thing. This fertility is sacred. The display of species, especially when they are endangered, raises the "God question" because species are one place where we come near the ultimacy in biological life. This genesis is, in biological perspective, "of itself," spontaneous, autonomous; and biologists find nature to be prolific, even before the question of God is raised. Afterward, theologians wish to add that in such a prolific world, explanations may not be over until one detects God in, with, and under it all.

The word "design," so much argued over by both theologians and biologists, nowhere occurs in Genesis. "Design" is borrowed from mechanics and their machines. Here, rather, is "genesis" by divine fiat, and the mode is an empowering permission that places productive autonomy in the creation. Biologists cannot deny this creativity; indeed, biologists, better than anyone else, know that Earth has, over the millennia, exuberantly brought forth the natural kinds. Genesis is the better word, with "genes" in it, the gift of self-creation. The question is not so much whether these creatures have *design* as whether they have *value*. Do they have inherent goodness? A thing does not have to be directly intended to have value. It can be the systemic outcome of a value generating process. If it results from such creativity, it is a valuable achievement.

In only seeming contrast to Adam and Noah, who are trustees of the creation, Job rejoices in how the nonhuman creation is wild, free from the hand of man, the diverse kinds situated in their niches. "Who has let the wild ass go free? Who has loosed the bonds of the swift ass, to which I have given the steppe for its home, the salt land for its dwelling place? ... It ranges the mountains as its pasture, and it searches after every green thing" (Job 39:5-6, 8).⁷ "Is it by your wisdom that the hawk soars, and spreads its wings toward the south? Is it at your command that the eagle mounts up and makes its nest on high? It lives on the rock and makes its home in the fastness of the rocky crag. From there it spies the prey; its eyes see it from afar. Its young ones suck up blood; and where the slain are, there it is" (Job 39:26-40:2). "The high mountains are for the wild goats; the rocks are a refuge for the coney. . . . The young lions roar for their prey, seeking their food from God. . . . O Lord, how manifold are your works! In wisdom you have made them all" {Ps. 104:18-24).

God not only sends rain on the just and the unjust; God sends rain to satisfy wildlands. "Who has cut a channel for the torrents of rain, and a way for the thunderbolt, to bring rain on a land where no one lives, on the desert, which is empty of human life, to satisfy the waste and desolate land, and to make the ground put forth grass?" (Job 38:25-27). God not only blesses humans; God blesses the desolate wastes. These fierce landscapes, sometimes supposed to be

ungodly places, are godly after all. God does not want all these places subdued and cultivated; rather, God delights in places with no people!

The Bible and Environmental Ethics

So biblical writers put humans in their place; there is a people-to-people ethic of concern for any viable human ecology, and this takes place in a sphere swarming with creatures that are also of concern. Depending on the focus, this ethic is anthropocentric, or biocentric, or theocentric, but it is environmental at every scale. The Bible is a religion for people, directing them how to live together in justice and love, under God and within a nature with which they have an entwined destiny. The Hebrews envisioned a culture in harmony with nature, sustainable living, and they found themselves at the center of that effort. Palestine was their life-support system, and the destiny of the land was to drip honey into the mouths of Abraham and his progeny.

Then, satisfied with milk, oil, and honey, these Hebrews considered what they were at the center of. Their destiny is played out in a biosphere; there is place for all creatures great and small, down to "every creeping thing that creeps upon the earth" (Gen. 1:26). Both humans and these creepy-crawlies have roles as parts in a whole cosmology; Canaan is a niche where Israel can work out its destiny in harmony with the integrity of creation. The aboriginal human couple is invited to "have dominion over," to "till and keep," or, better, to "till and serve" this creation. This kind of ethic, this kind of authority, this evaluation of who we are and where we are, cannot be found in ecological science; one place such conviction gets launched is in encounter with these ancient scriptures.

NOTES

1. J. M. Cherrett, "Key Concepts: The Results of a Survey of Our Members' Opinions," in Cherrett, ed., *Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World* (London: Blackwell Scientific, 1989), 1-16.

2. Daniel J. Hillel, *Out of the Earth: Civilization and the Life of the Soil* (New York: Free Press, 1991).

3. Aldo Leopold, "The Land Ethic," *A Sand County Almanac* (New York: Oxford University Press, 1968), 201-26.

4. U.S. Congress, *Endangered Species Act of 1973*, Sec. 2. (a)(1), 87 U.S. Stat. 884.

5. *Endangered Species Act*, Sec. 2. (a) (3).

6. John Muir, *Our National Parks* (Boston: Houghton Mifflin, 1901), 331,

7. *Equus hemionus hemippus*, the smallest of the living equids, about one meter high at the shoulder, was endangered even in Bible times. It was impossible to domesticate, and persisted untamed in Palestine until 1927, when it became extinct. In a current effort to restore to Israel all the species mentioned in the Bible, another subspecies, *Equus hemionus onager*, from Iran, has been introduced to replace it.