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CHAPTER 17

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**SCIENCE AND RELIGION
IN THE FACE OF THE
ENVIRONMENTAL CRISIS**

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BOTH science and religion are challenged by the environmental crisis, both to reevaluate the natural world and to reevaluate their dialogue with each other. Both are thrown into researching fundamental theory and practice in the face of an upheaval unprecedented in human history, indeed in planetary history. Life on Earth is in jeopardy owing to the behavior of one species, the only species that is either scientific or religious, the only species claiming privilege as the "wise species," *Homo sapiens*.

Nature and the human relation to nature must be evaluated within cultures, classically by their religions, currently also by the sciences so eminent in Western culture. Ample numbers of theologians and ethicists have become persuaded that religion needs to pay more attention to ecology, and many ecologists recognize religious dimensions to caring for nature and to addressing the ecological crisis. Somewhat ironically, just when humans, with their increasing industry and technology, seemed further and further from nature, having more knowledge about natural processes and more power to manage them, just when humans were more and more rebuilding their environments, thinking perhaps to escape nature, the natural world has emerged as a focus of concern. Nature remains the milieu of

culture—so both science and religion have discovered. In a currently popular vocabulary, humans need to get themselves "naturalized." Using another metaphor, nature is the "womb" of culture, but a womb that humans never entirely leave. Almost like God—to adopt classical theological language—nature is "in, with, and under us."

Religious persons regularly find something "beyond" such naturalizing, holding that nature is not self-explanatory. Believers point to deeper forces, such as divine presence or Brahman or emptiness (*sunyata*) or the Dao underlying. Religions may detect supernature immanent in or transcendent to nature, perhaps even more so in human culture, though some religions prefer to think of a deeper account of Nature, perhaps enchanted, perhaps sacred.

Scientists search for natural explanations; at least a methodological naturalism may be required as scientific method. But scientists are of mixed minds about whether, when some so-called natural explanation is discovered, explanation is over. At cosmological scales there is deep space and time; at evolutionary scales Earth is a marvelous planet, a wonderland lost in this deep space-time. Humans can seem minuscule at astronomical levels; they can seem ephemeral on evolutionary scales. Humans do not live at the range of the infinitely small or at that of the infinitely large, but humans on Earth do seem, at ecological ranges, to live at the range of the infinitely complex, evidenced both in the biodiversity made possible by genetics and in the cultural history made possible by the human mind. In humans, there is the most genesis—so far as we yet know.

Contemporary biologists have not only described but come to celebrate the diverse array of forms of life on Earth and then to lament that humans are placing so many of them in jeopardy. What to make of Earth, the home planet? What to make of who we are, where we are, what we ought to do? The "deep" thoughts about this "deep" nature are right here, in religious and scientific minds. What seems always to remain after science are the deeper value questions. After four centuries of Enlightenment and Western science, and with due admiration for impressive successes, the value questions in today's world are as urgent, sharp, and painful as ever—evidenced by the environmental crisis. There is no scientific guidance of life.

This analysis raises issues surrounding (1) value in nature, then asks about (2) the connections between science, conscience, and conservation. (3) Puzzling over attitudes toward evolutionary natural history, we view that life struggle as renewal and regeneration and, in more religious terms, as life's redemption, leading to reverence for life. Western monotheist traditions affirm the goodness of creation. (4) Is there something to be learned encountering Eastern and indigenous faiths? (5) We look at ecology as a science and its joining with human ecology, where the religious dimension is more evident. (6) That leads to questions about nature and human nature, the human place and possibilities. Humans are part of and yet apart from nature; we evolved out of nature, yet require a sustainable biosphere.

(7) Humans are moral agents, and, facing current development and a sustainable future, questions of environmental justice have become urgent. (8) Indeed, facing the next century Earth, the planet of promise, is a planet in peril. Science and religion will both be required for our salvation.

VALUE IN NATURE

Value is a frequently encountered term in evolutionary biology and ecosystem science—and this despite the "value-free" aspect of science about which we will worry below. "An ability to ascribe value to events in the world, a product of evolutionary selective processes, is evident across phylogeny. Value in this sense refers to an organism's facility to sense whether events in its environment are more or less desirable" (Dolan 2002: 1191). Adaptive value, survival value, is the basic matrix of Darwinian theory. An organism is the loci of values defended; life is otherwise unthinkable. Such organismic values are individually defended; but, ecologists insist, organisms occupy niches and are networked into biotic communities. At this point ethicists wonder whether there may be goods (values) in nature which humans ought to consider and care for. Animals, plants, and species, integrated into ecosystems, may embody values that, though nonmoral, count morally when moral agents encounter these. Perhaps also religious convictions can illuminate such values, those (as Judeo-Christian monotheists will say) of a good creation.

Environmental science informs any environmental evaluation in subtle ways. Consider some of the descriptive categories used of ecosystems: the *order*, *stability*, and *diversity* in these biotic *communities*. Ecologists describe their *interdependence* or speak of their *health* or *integrity*, perhaps of their *resilience* or *efficiency*. Biologists describe the *adapted fit* that organisms have in their niches, the roles they play. Biologists may describe an ecosystem as *flourishing*, as *self-organizing*. Strictly interpreted, these are just descriptive terms; and yet often they are already quasi-evaluative terms. Order, stability, diversity, interdependence, fitness, health, integrity are values too—perhaps not always so but often enough that by the time the descriptions of ecosystems are in, some values are already there and putting constraints on what we think might be appropriate human development of such areas (Keller and Golley 2000; Golley 1998).

At the same time, however much ecology reframes nature for our reevaluation, the deeper evaluative questions are still left open. In that sense, science cannot teach us what we most need to know about nature, that is, how to value it. At this point one may need to turn to religion or something like it. Bible writers,

for example, 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! / Beasts and all cattle, / creeping things and flying birds!" (Ps. 148:7-10). "You crown the year with your bounty; / the tracks of your chariot drip with fatness, / The pastures of the wilderness drip, / the hills gird themselves with joy, / the meadows clothe themselves with flocks, / the valleys deck themselves with grain, / they shout and sing for joy" (Ps. 65:11-13). Encountering the vitality on their landscapes, the Hebrews formed a vision of creation, cast in a Genesis parable about a series of divine imperatives that empower earth with vitality.

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 things according to their kinds" (1:11, 24). "Let the waters bring forth swarms of living creatures" (1:20). Earth speciates. God, say the Hebrews, 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" (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!"

Value in nature is recognized again when the fauna is included within the Hebrew covenant: "Behold I establish my covenant with you and your descendants after you, and with every living creature that is with you, the birds, the cattle, and every beast of the earth with you" (Gen. 9:9-10). The fallow fields and vineyards, for example, were to be open to the birds and beasts. In modern terms, the covenant was both ecumenical and ecological. It was theocentric, theologians might insist, but if so it was also less anthropocentric and more biocentric than traditional Jews or Christians realized. Noah with his ark was the first Endangered Species Project, despite the disruptions introduced by human evil. 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 with the Endangered Species Act in 1973.

The values in nature found by biologists can couple with the values in nature detected by prophets, sages, saviors. To continue with the monotheist tradition, although nature is an incomplete revelation of God's presence, it remains a mysterious sign of divine power. In the teachings of Jesus, "the birds of the air neither sow nor reap yet are fed by the heavenly Father, who notices the sparrows that fall. Not even Solomon is arrayed with the glory of the lilies, though the grass of the field, today alive, perishes tomorrow" (Matt. 6). 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. "A generation goes, and a generation comes, / but the earth remains forever" (Eccles. 1:4).

True, Jesus says, "My kingdom is not of this world." Teaching as he did in the imperial Roman world, his reference, however, in "this world" is to the fallen world of the culture he came to redeem, to false trust in politics and economics (or science, we add), in armies and kings (or scientists). God loves the world, and in the landscape surrounding him Jesus found ample evidence of the presence of God. He teaches that the power organically manifest in the wildflowers of the field is continuous with the power spiritually manifest in the kingdom he announces. Nature, ever dynamic and changing, is valued for its glorious, divine creativity, in contrast to the political world with its misplaced values, in need of redemption.

SCIENCE, CONSCIENCE, AND CONSERVATION

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Humans are a quite late and minor part of the world in evolutionary and ecological senses. Resulting from processes in natural history, they are one more primate among hundreds, one more vertebrate among tens of thousands, one more species among many millions. But there is also a way in which this last comes to be first. *Homo sapiens* is the first and only part of the world free to orient itself with a view of the whole, to seek wisdom about who we are, where we are, where we are going, what we ought to do. Such inquiries have classically been thought of as philosophical or religious. But, facing an ecological crisis, the question arises whether and how far human environmental ethics can be drawn from the scientific study of nature.

Scientists and ethicists alike have traditionally divided their disciplines into the realm of the *is* and the realm of the *ought*. By this division, no study of nature can tell humans what ought to happen, on pain of committing the naturalistic fallacy. Ecologists who claim to know what we ought to do, or theologians who claim to base ethics on ecology, may be violating the long-established taboo against mixing facts and values. This neat division has been challenged by ecologists and their philosophical interpreters. There is ambiguity: ecology, as we noticed above, reframes ways that we think about nature, but leaves deeper questions unanswered.

Though biologists (in their philosophical moments) are typically uncertain whether life arrived on Earth by divine intention, they are almost unanimous in their respect for life and seek biological conservation on an endangered planet.

Biologists find biological creativity indisputable, whether or not there is a creator. Biologists have no wish to talk theologians out of genesis. Whatever one makes of God, biological creativity is indisputable. There is creation, whether or not there is creator, just as there is law, whether or not there is a lawgiver. Biologists are not inclined, nor should they be as biologists, to look for explanations in supernatural, but biologists nevertheless find a nature that is super! Superb! Biologists are taught to eliminate from nature any suggestions of teleology, but no biologist can doubt genesis.

Earth's impressive and unique biodiversity, evolved and created, warrants wonder and care. Anciently, the Hebrews marveled over the "swarms" (= biodiversity) of creatures that earth brings forth in Genesis 1, brought before man to name them (a taxonomy project!). Classically, theologians spoke of "plenitude of being." Contemporary biologists concur that Earth speciates with marvelous fecundity; the systematists have named, catalogued a far more vast genesis of life than any available to ancient or medieval minds. There is but one species aware of this panorama of life, a species at the same time jeopardizing this garden Earth.

While this seems congenially to couple the concerns of biology and religion, others are more cautious. They worry about that naturalistic fallacy and warn that 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 the 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 as any of that is our ecological crisis (Rasmussen 1996; Ruether 1992).

How do persons rise from the *facts* of natural history, Earth's biodiversity as described by biology, to what *ought to be*, human caring for a valuable creation, as urged by religious faith? Whatever the uses to which science is put, better or worse, there are the quite commanding discoveries that science has made about the history of life on Earth. There is something awesome about an Earth that begins with zero and runs up toward five million to ten million species in several billion years, setbacks notwithstanding. The long evolutionary history, fact of the matter, seems valuable; it commands respect, as biologists recognize, even reverence, as theologians claim. When one celebrates the biodiversity and wonders whether there is a systemic tendency to produce it, biology and theology become natural allies. Perhaps this alliance can help humans to correct the misuses to which science has been put—with more respect and reverence for life.

THE LIFE STRUGGLE: REGENERATION, REDEMPTION, REVERENCE

Critics at this point caution again against too easy an alliance between biology and faith. There has been, and continues to be, conflict between Darwinian evolutionary biology and monotheistic faith. Living organisms must compete, pressed for adapted fit, struggling to hold a place against other lives. Survival is the name of the game. Nature is "red in tooth and claw." The process is prolific, but evolutionary history can seem tinkering and makeshift. One might respect the survivors for their achievement and adapted fit, but this blind struggle for survival is not a process one can reverence.

This dimension of struggle, however, can be fitted into a more inclusive perspective, which ecology adds to evolution. The community of life is continually regenerated, as well as creatively advanced, and this requires value capture as nutrients, energy, and skills are shuttled round the trophic pyramids. From a systemic point of view, this is the conversion of a resource from one life stream to another—the anastomosing of life threads that characterizes an ecosystem. Ecology traces the systematic interconversion of life materials—how nature recycles. Death *in vivo* is death ultimately; death *in communitatis* is death penultimately but life regenerated over the millennia of species lines and dynamic biotic communities, continuing almost forever.

The idea of adapted fit also requires a niche, a place to be, and includes a life-support system. An ecology is a home. The currents of life flow in the interplay of environmental conductance and environmental resistance. An environment that was entirely hostile would slay all; life could never have appeared within it. An environment that was entirely irenic would stagnate life. The vital process is conflict and resolution. Take away the friction, the stress, and would the structures stand? Would they move? The organism is tested for how much information it can contribute to the next generation. Survival of the fittest is survival of the senders. Suffering? Struggle? Yes. But if we may borrow a word from the Socratic philosophers, life is in "dialectic."

The evolutionary picture is of nature laboring in travail. The root idea in the English word *nature*, going back to Latin and Greek origins, is that of "giving birth." Birthing is creative genesis, which certainly characterizes evolutionary nature. Birthing (as every mother knows) involves struggle. Earth slays her children, a seeming evil, but bears an annual crop in their stead. Birthing is nature's orderly self-assembling of new creatures amidst this perpetual perishing.

In ecosystems, organisms are both challenged and supported. Every organism is what it is where it is, the "skin-out" environment as vital as "skin-in" metabolisms. Early ecologists favored ideas such as homeostasis and equilibrium.

Contemporary ecologists emphasize more role for contingency or even chaos. Others incline to emphasize self-organizing systems (autopoiesis), also an ancient idea: "The earth produces of itself [Greek 'automatically']" (Mark 4:28). Some find that natural selection operating on the edge of chaos offers the greatest possibility for self-organization and self-transformation.

Within the structural constraints and mutations available, the process optimizes adapted fit. There is much openness, emergence, surprise, struggle, loss, gain, or wandering. Natural selection is thought to be blind, initially in the genetic variations bubbling up without regard to the needs of the organism, some few of which by chance are beneficial, and also in the evolutionary selective forces, which select for survival, without regard to advance. Many evolutionary theorists insist that nothing in natural selection theory guarantees progress; most doubt that the theory predicts, or even makes probable, the long-term historical innovations that have occurred. Others think that the creative results are inherent in the system.

Whether biologists can find such selective principles, it seems that something is at work making the system fertile, prolific, sustaining development, combining both innovations and novelties with stabilities and regularities so as to perpetuate a swelling wave. This portrays a loose teleology, a softer concept of creation than that in classical monotheism; and yet one that permits genuine integrity and autonomy in the self-developing creatures. The classical theology of design will need reforming. What theologians once termed an established order of creation is rather a natural order that dynamically creates, an order for creating.

But any biology of randomness and bloody struggle will equally need reforming. The system historically uses pain for creative advance. Ecologists subsume struggle under the notion of a comprehensive situated fitness. With this, one begins to get a new picture painted over the old, although some of the old picture still shows through. Theologically speaking, this position is not inconsistent with a theistic belief about God's providence; rather, it is in many respects remarkably like it. There is grace sufficient to cope with thorns in the flesh (2 Cor. 12:7-9).

The better biological categories are those of values achieved, actualized, shared, and conserved in a natural history of dramatic creativity. Such a reinterpreted biology will be reasonably congenial to theology. The facts of the matter give sufficient cause to wonder about reverence for creation. Where there is creativity, the religiously minded have cause to wonder whether there may lurk a creator.

Even the secular naturalists will find that a prolife principle is overseeing this earthbound history of matter and energy; they may be moved toward respect, even reverence. Stephen Jay Gould, for example, found on Earth "wonderful life," if also "chance riches" (1989; 1980), and he was moved, among the last words he wrote, to call the earthen drama "almost unspeakably holy" (2002:1342). Edward O. Wilson, a secular humanist, ever insistent that he can find no divinity in, with, or under nature, still exclaims: "The biospheric membrane that covers the Earth, and you and me,... is the miracle we have been given" (2002: 21).

Asking about respect for creation, critics of Western monotheism may reply that the problem is the other way round. Judeo-Christian religion has not adequately cared for nature because it saw nature as the object of human dominion. Famously, historian Lynn White laid much of the blame for the ecological crisis on Christianity, an attack published in *Science*, the leading journal of the American Association for the Advancement of Science (White 1967). God's command in Genesis 1 for humans to "have dominion" over nature flowered in medieval Europe, licensed the exploitation of nature, and produced science and technology that have resulted in an ecological crisis. Equally, of course, White was attacking science for buying into a secular form of the dominion hypothesis, but the original authorization, so he claimed, was religious. After the fall and the disruption of the garden earth, nature too is corrupted and life is even more of a struggle than before. Nature needs to be redeemed by human labor.

Christians, it may further be complained, are headed for heaven; they have little use for Earth. One would first assume that religious people, like everyone else, will protect the environment when they realize its importance to their own health and the health of their children. But religious conservatives of an apocalyptic bent believe that the end days are near. Why worry about conserving Earth if you are shortly to be taken up in rapture? Indeed the famine (from desertification, escalating populations), floods (from melting polar caps), and pestilence (rapidly spreading exotic diseases, drug-resistant pathogens) are signs of the tribulation foretold in the Bible. But such apocalyptic views hardly seem characteristic of mainstream Christianity.

Theologians have replied that dominion requires stewardship and care (Birch, Eakin, and McDaniel 1990; Cobb 1972; DeWitt 1998; Nash 1991; Northcott 1996; Fern 2002). Adam and Eve are also commanded to "till the garden and keep it" (Gen. 2:15). There are more positive senses of dominion. Adapting biblical metaphors for an environmental ethic, humans on Earth are and ought to be prophets, priests, and kings—roles unavailable to nonhumans. Humans should speak for God in natural history, should reverence the sacred on Earth, and should rule creation in freedom and in love. As we have already seen, ample biblical passages celebrate the goodness of nature and urge its respect. In fact, religious persons can bring a perspective of depth on nature conservation. They will see in forest, sky, mountain, and sea the presence and symbol of forces in natural systems that transcend human powers and human utility. They will find in encounter with nature forces that awful fill one with awe and are overpowering, the signature of time and eternity. In the midst of its struggles, life is ever "conserved," as biologists might say; life is perpetually "redeemed," as theologians might say. Or, to adapt a biblical metaphor: the light shines in the darkness, and the darkness has not overcome it. That natural history does command our respect and our reverence.

EASTERN AND INDIGENOUS FAITHS

Given that the monotheistic faiths, characteristic of Western peoples, are implicated in the ecological crisis, perhaps a turn to Asian faiths or to those of indigenous peoples will result in a better joining of religion and ecological science, with better proposals for addressing the environmental crisis.

In Daoism, for example, might the yang and yin suggest ecological harmony and cooperation? Ecosystems undergo periodic successions, cycles and rhythms, returnings. Everything results from the negentropic yang and the entropic yin, dialectically entwined. Might this account bring into better balance the human drive to dominate nature? Huston Smith diagnoses how the West has been on a wild "yang trip," evidenced in science and resulting in the ecological crisis, against which Daoism "throws its ounces on the side of the yin, but to recover the original wholeness" (Smith 1972: 80). The ecological crisis results from too much muscle, macho; the West needs a recovery of the feminine; we need to flow with nature, properly to attune ourselves to its rhythms in counterpoint. The Dao that is descriptive of nature becomes prescriptive for human behavior.

Some excess in Western religion (the dominion of humans) is driving the scientific view in both theory and practice (yielding analytic science and technological science) which can be corrected by an Eastern metaphysics (binary complementarity), moderating the arrogance operating in science. Then again, a Daoist ecology might be more muddle than model, like a Buddhist biochemistry, a Hindu meteorology—or like the Christian ecology we were just exploring. Used as a comprehensive explanation, the Dao conflates many processes that, outside of the persuasive influence of this paradigm, have no discoverable connection with each other in nature that the sciences said to be congenial with it have yet revealed. Male and female have little to do with wet and dry, with mountains and valleys, or with eating foods that grow above and below ground. The waxing of youths and the waning of the elderly is a different phenomenon from the sweet and the sour. The near omnipresence of sexuality in biology has nothing to do with succession in ecology. The yang and yin, some mystic force bonding complements, is only superficially congenial with ecology, and advice such as "More yin!" can only superficially orient humans how they ought to behave in encountering nature.

The first Buddhist commandment is the injunction to *ahimsa* ("noninjury"), reverence for life. The Buddhist analysis of the phenomenal world is of karma and rebirth; all things are forever born and reborn; they fit together like gems in a net. Nothing is despised, however lowly it might be; the *bodhisattvas* vow to enlighten the last blade of grass. Phenomenal things are intimately identified with the divine. All is one; one is all. Continuing its analysis, the phenomenal world is like

a cycling wheel (*samsara*) driven by desire (*tanha*, "thirst"). Buddhism urges the control of desires, surely a requisite for any solution to environmental problems. Humans should stop their thirsts (abetted by Western dominance and consumerism) and find a more meaningful life of balance. The Dalai Lama has made repeated appeals for caring for nature and living in harmony with nature.

But again there are misgivings. The Buddhist natural history, like human history, is appearance (*maya*, "illusion") spun over emptiness (*sunyata*). As with the monotheists troubled by the character of the evolutionary process, the Buddhist tradition too may have difficulties knowing how much of the phenomenal world to embrace and how much to see through or transcend. The core ideas of emptiness and of extinction of desires (*nirvana*) do not initially seem promising for conserving the phenomenal world.

Moving from theory to practice, as the West has encountered an environmental crisis, the East has imported Western science and technology. The East now faces on its own soil the task of applying its religions to these sciences for an effective valuing of nature. But China has, officially at least, largely repudiated its classical past and turned to Western (if also Maoist) outlooks. Perhaps Buddhism can help resolve environmental problems in industrialized Eastern nations—Japan, Taiwan, or Korea, for example. So far, however, the results are not impressive.

Aboriginal worldviews are plural and diverse: Native Americans differ from Australian indigenous peoples, who differ from African peoples. Many such accounts are animist; nature is animated with spirits. Humans are part of such inspirited nature. Such peoples live in a sacred, almost an enchanted world, which they encounter with reverence. This combines with an intimate knowledge of local environments, since such peoples lived immediately in nature for centuries, a knowledge sometimes superior to that of Western ecologists. By contrast Western scientific views of nature have been mechanistic, although biologists and especially ecologists now prefer to think of earthen nature as organic system. Toward such nature, contemporary religious thinkers—so we have been arguing—advocate reverence also, but the character of such reference must be postscientific, and this cannot be the same as the aboriginal reverence, which is (to use a pejorative word) superstitious.

Conflicts have arisen over sacred sites (such as Devil's Tower in Wyoming or Uluru in Australia) or wildlife (sacrificing eagles or cougars in religious ceremonies). In practice, critics argue that native peoples were seldom ecologically noble savages; they did what they had to do to survive and were quick to adopt guns and horses and to modernize when offered Western technology. Their aboriginal accounts worked well enough over millennia, but they served as mythologies for local coping. They deserve respect. But these views are not likely to supply useful models to address contemporary environmental issues, such as loss of biodiversity, global warming, or global capitalism.

ECOLOGY AND HUMAN ECOLOGY

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The term *ecology* is, etymologically, the logic of living creatures in their homes, a word suggestively related to "ecumenical," with common roots in the Greek *oikos*, the inhabited world. Human culture is entwined with nature; humans must have their ecology. An evident form of value in ecosystemic nature arises because humans, since they must be at home on Earth, have a great deal at stake in the condition of their ecosystems. To use a word that has come to center stage since the U.N. Conference on Environment and Development, humans require "sustainability" in their relations to natural systems (World Commission on Environment and Development 1987). Over 150 nations have endorsed sustainable development.

But whereas the U.N. Conference on Environment and Development focus was on "sustainable development," ecologists have insisted that the ultimate criterion is a "sustainable biosphere." The Ecological Society of America, for example, has made a sustainable biosphere a priority in its research: "Achieving a sustainable biosphere is the single most important task facing humankind today" (Risser, Lubchenco, and Levin 1991). Any sustainable human development must come within those more fundamental parameters. "Maximizing human development," even sustainably, returns to a dominion that exploits nature solely for human purposes. Humans ought rather to fit themselves into a sustainable biosphere, as members of a larger community of life on Earth. That is a better logic of our being at home on Earth.

Scientists turning to environmental policy often advocate ecosystem management. This promises to combine what ecosystems are, scientifically, with what we humans wish to do, employing them in our cultural stories. This appeals alike to scientists, who see the need for understanding ecosystems objectively and for applied technologies; to landscape architects and environmental engineers, who see nature as redesigned home; to developers, who like the idea of management; and to humanists, who desire benefits for people. Further, this seems balanced to politicians and environmental policymakers, since the combined ecosystem/management principle promises to operate at the systemwide level, presumably to manage for indefinite sustainability, alike of ecosystems and their outputs for human benefit. Such management sees nature as "natural resources" at the same time that it has a "respect-nature" dimension. Christian ethicists note that the secular word *manage* is a stand-in for the earlier theological word *steward* and also note the connections with biblical *dominion* as caring for a garden earth.

Ethicists have frequently thought of ethics as a social contract; religions teach people how to get along with people. Ecologists add that ethics needs also to be a natural contract, human responsibility for this ecological/ecumenical planet on which we reside. The U.S. Congress, for example, in the National Environmental

Policy Act expects that the ecological sciences can help the nation "to create and maintain conditions under which man and nature can exist in productive harmony" (U.S. Congress 1969: §101(a)). Can religious faith enter into this effort?

There are both problems and opportunities when religious ethicists look toward ecological science and wonder what (use) to make of it. An environmental ethic is foolish not to be informed by the best such science available. The success of an environmental policy does not depend merely on the cultural and religious values, the policy preferences, or the social institutions that drive the human actors. Success depends on coupling such prescriptive values with an environmental science that is descriptively accurate and operationally competent. On the other hand, there are many pitfalls and one has to proceed cautiously.

Ecology is a natural science, and one might make a mistake to think that the classical faiths knew anything about such science, any more than they knew astronomy or molecular biology. The British Ecological Society surveyed their members to rank the fifty most important concepts in ecology (Cherrett 1989). On that list one finds concepts such as the ecosystem, succession, the niche, habitats, food webs and trophic levels, carrying capacity, territoriality, keystone species, energy flow, 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. At this point, religious accounts and scientific accounts can seem quite far apart.

At the same time, ecologists do not have much grand theory, laws that are always and everywhere true all over the e\Earth, seemingly because of the complexity, dynamism, change, and openness in ecosystems. Ecology is a piecemeal science that can, despite any general principles, when it comes to specifics, be good only at generalizations of regional or local scope—what will happen in the Sonoran Desert in drought or to the mussels in the Tennessee River at certain pollution levels. But if this is true, then we might have dismissed the ecological wisdom embodied in classical and indigenous faiths too quickly. There is an important difference between ecology and astrophysics or cellular biology. Ecology is a science at native range. Perhaps the Bible writers did not know the Lotka-Volterra equations or the nitrogen cycle in the soil. But they did live at the pragmatic ranges of 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 heart of man, / and oil to make his 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 in the seventh year, to restore its productivity. Abraham and Lot, and later Jacob and Esau, dispersed their flocks and herds because "the land could not support both of them dwelling 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. Academic ecologists 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 Abraham and Lot's problem) take a part out of the whole, the lawlike or repetitively patterned aspect isolated out for the science, while there is in real nature law mingled with the particulars of the local environment: the pastures "from the Negev 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. As we earlier noted, the textbook ecologist is likely to be able to learn something from any people indigenous to a landscape for centuries. Rural peoples in ancient Palestine might have been better in contact with nature than biological academics, who sit in offices and laboratories.

Passing from such human ecology to ethics, religious ethicists can with considerable plausibility make the claim that neither technological development, nor conservation, nor a sustainable biosphere, nor sustainable development, nor any other harmony between humans and nature can be gained until persons learn to use the earth both justly and charitably. Those twin concepts are not found either in wild nature or in any science that studies nature. They must be grounded in some ethical authority, and this has classically been religious.

One needs human ecology, humane ecology, and this requires insight more into human nature than into wild nature. True, humans cannot know the right way to act if they are ignorant of the causal outcomes in the natural systems they modify—for example, the carrying capacity of the Bethel-Ai rangeland. But there must be more. The Hebrews were convinced that they were given a blessing with a mandate. The land flows with milk and honey (assuming good land husbandry) if and only if there is obedience to Torah. Abraham said to Lot, "Let there be no strife between me and you, and between your herdsmen and my herdsmen" (Gen. 13:8), and they partitioned the common good equitably among themselves.

The big problem is not figuring out what intrinsic values are out there in wild nature and how much they count; the problem is rather dealing with the disvalues in humans—their irrationality, their greed, their shortsightedness, in short, their sinfulness. Sacred scriptures are books about how to live justly, not about how natural history works. The righteous life depicted in the Hebrew Bible is about a long life on earth, sustainable until the third and fourth generations. Whatever it has to say about heaven or life after death, the Bible is also about keeping this earthly life divine, godly, or at least human, humane, or 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 classical religious faiths to learn.

How *nature* works is the province of the physical and biological sciences. How *human nature* works is the province of religion, both how human nature does and how it should work. Religions emphasize the *human*, not the *ecology* side of the relationship.

NATURE AND HUMAN NATURE

Religions are about a gap between what is and what *ought to be* and how to close that gap. This often requires revealing how human nature functions and dysfunctions, works and fails to work, and how to reform or redeem this "fallen" nature. Nature can take care of itself; God will perennially regenerate, redeem the creation, as has happened for millennia. But in religion God is redeeming humans, and that is redemption of a different order. One does not turn to ancient scriptures to learn modern ecological science, but there might be classical insights into human character there, as vital today as they ever were. 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, 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 ecology, any more than from astrophysics or soil chemistry. Science could be part of the problem, not part of the solution; we met earlier those claims that science is used for Western dominion over nature, and science is equally used for Western domination of other nations.

Biologists appear at this point with a further concern, deeply troubling. If the theologians have found in humans a tendency to self-interest, to selfishness, to sin, biologists concur. Now the biologists may indeed claim to know something about human nature; humans are innately selfish by Darwinian natural selection. The nature inherited in human nature is self-interested, and this, in an environmental crisis, may prove self-defeating. Theologians and biologists alike find too much in human nature that is irrational, blind. Although the conservation biologists celebrate earth's biodiversity, the sociobiologists (or, later, evolutionary psychologists) worry that the human disposition to survive, a legacy of our evolutionary heritage, has left humans too shortsighted to deal with the environmental crisis at the global level.

Such biologists hold that we are naturally selected to look out after ourselves and our families, perhaps also to cooperate in tribes or for reciprocal benefits. Beyond that, humans are not capable of more comprehensive altruism, considering

the interests of others in foreign nations or in future generations, if this is at the expense to our own interests (Sober and Wilson 1998; D. Wilson 2002). Humans are not rational in any absolute or even global sense; they bend their reason to serve their interests, competitively against others—other nations, tribes, or neighbors—when push comes to shove. Hence the escalating violence and terrorism in today's world, often as not claiming their cause in the name of some faith. Humans inherit Pleistocene urges, such as an insatiable taste for sugar, salt, fats, traits once adaptive, but which today make obesity a leading health problem. Our global environmental problems—escalating populations, escalating consumerism, escalating capitalism, escalating nationalism, the rich getting richer, the poor poorer—result from such Pleistocene urges.

A further trouble is that many environmental problems result from the incremental aggregation of actions that are individually beneficial. Coupled with a long lag time for environmental problems to become manifest, this masks the problem in both nature and human nature. A person may be doing what would be, taken individually, a perfectly good thing, a thing he or she has a right to do, were he or she alone, but which, taken in collection with thousands of others doing the same thing, becomes a harmful thing. A good thing escalates into a bad thing. This is Garrett Hardin's tragedy of the commons (1968). Pursuit of individual advantage destroys the commons. Biologists may claim that humans are not genetically or psychologically equipped to deal with collective issues that upset individual goals (Ehrlich and Ehrlich 2004).

Religious believers may welcome enlightened self-interests, caring for family, patriotism, and mutually beneficial reciprocity. But they go on to insist that, while indigenous faiths may remain local or locals may bend a more comprehensive faith to their denominational interests, the major world faiths have been quite trans-tribal, transnational. Their ethics is quite ecumenical, for example, the Golden Rule or the Good Samaritan. They have spread widely around the globe; Christianity began in the Middle East but there are now more Christians in South America than in the Middle East. Reformed Christianity was launched in Switzerland, spread to Scotland and North America, and today there are more Presbyterians in Korea than in any other nation. These Korean Presbyterians have themselves sent out forty thousand missionaries to over one hundred countries. This is good evidence that religious faith can transcend narrowly self-calculating family, tribal, or national interests with comprehensive global concern for the salvation of others, genetically unrelated. If so, and if this salvation now comes to be seen to require caring for the Earth, sustaining the biosphere, the home for us all, religious faiths may already have on hand the commitment and resources for addressing global problems that require this larger, transgenetic, sense of community.

Religions do not teach that humans simply follow either nature or human nature. Nature does not teach us how we ought to behave toward each other. Compassion and charity, justice and honesty, are not virtues found in wild nature.

There is no way to derive any of the familiar moral maxims from nature: "One ought to keep promises." "Do to others as you would have them do to you." "Do not cause needless suffering." No natural decalogue endorses the Ten Commandments. Humans, if uniquely the wise species, are also uniquely the species that needs redemption. Religions may celebrate creation or struggle what to make of evolutionary history. But the real business of religion is salvation, mending the perennial brokenness in human nature.

Humans sin, unlike the fauna and flora. Religion is for people and not for nature, nor does salvation come naturally; even the earthly good life is elusive. Ultimately such salvation is beyond the natural, perhaps supernatural by the grace of the monotheist God, perhaps in some realization of depths underlying the natural, such as Brahman or *sunyata*. Meanwhile, whatever the noumenal ultimate, humans reside in a phenomenal world, which they must evaluate and in which they must live, hopefully redeemed or enlightened by their faiths.

ENVIRONMENTAL JUSTICE

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 Much concern has come to be focused on environmental justice; the way people treat each other is related to the way they treat nature. If humans have a tendency by nature to exploit, they will as soon exploit other people as nature. These are the underlying theological and ethical issues underlying global capitalism, consumerism, nationalism. The combination of escalating populations, escalating consumption, global capitalism, struggles for power between and within nations, and militarism results in environmental degradation that seriously threatens the welfare of the poor today and will increasingly threaten the rich in the future. The four critical items on our human agenda are population, development, peace, and environment. All are global; all are local; all are intertwined; in none have we modern humans anywhere yet achieved a sustainable relationship with our Earth. Our human capacities to alter and reshape our planet are already more profound than our capacities to recognize the consequences of our activity and deal with it collectively and internationally.

Today 80 percent of the world's production is consumed by 20 percent of its peoples, and 80 percent of the world's population is reduced to living on the remaining 20 percent; there is strife about this, and environmental degradation in result. What is the equitable thing to do? That is human ecology with a focus on the ethics, not the science. No ecological science can supply answers. Answers are not easy to come by from the Hebrew, Christian, Buddhist, Daoist, or Hindu scriptures, but in consensus these religions proclaim that justice and love are necessary parts of the answer.

Many of Earth's natural resources, unevenly and inequitably distributed, have to flow across national lines, if there is to be a stable community of nations. People have a right to water; that seems plausible and just. But 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 percent–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.

In an ethics that provides for a shared commons, the international fabric will have to be stable and dynamic enough that a nation which 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 a fair share of the world's resources and goods, will be denied. Insecurity, hunger, and a sense of injustice will breed despair and outrage that will find a voice in violence, war, terrorism. The classical religions claim that they alone among the human institutions have a deep-seated universal ethical concern adequate to address such transnational issues.

But demanding one's rights and fair share is only half the truth. If pushed to the whole, this pushing becomes as much part of the problem as part of the answer. Perhaps the deepest trouble is this forever putting ourselves first, never putting ourselves in place in the fundamental biosphere community in which we reside. If we ask "What is the matter?" the deepest problem may be the conviction that nothing matters unless it matters to us. That returns to the original sin, to the beast within us not yet elevated to humanity. That disrupts, first, our nations and our cultures; it disrupts, second, and with equal damage our life support systems on Earth. Our welfare, our well-being, is a matter of living in sustainable communities, human and natural; this flourishing requires policies and behavior that keep population and development in harmony with landscapes. It is going to be difficult to keep peace with each other, until we are at peace with our environment.

What we want is not just riches, but a rich life, and appropriate respect for the biodiversity on Earth enriches human life. Humans belong on the planet; they will increasingly dominate the planet. But we humans, dominant though we are, want to be a part of something bigger. Contemporary ethics has been concerned to be inclusive. Environmental ethics is even more inclusive. It is not simply what a society does to its poor, its blacks, slaves, children, minorities, women, handicapped, or future generations that reveals the character of that society, but also what it does to its fauna, flora, species, ecosystems, landscapes. Environmental

justice needs to be ecojustice, as with the World Council of Churches' emphasis on "justice, peace, and the integrity of creation."

PLANET OF PROMISE, PLANET IN PERIL

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 Since the coming of science with its technology, since the invention of motors and gears in the mid-nineteenth century, giving humans orders of magnitude more power to transform the landscape, since the coming of modern medicine, there have been unprecedented changes in world populations in agricultural production, in industrial production, in transportation and communication, in economic systems with global capitalization, in military commitments—all these literally altering the face of the planet and threatening the future of the planet

Earth is the only planet with this display of life, so far as we yet know. This natural history warrants respect, reverence. Managing a landscape that has reared up such a spectacle of life becomes a matter of ethics and religion as well as of science. Entering a new millennium, we face a crisis of the human spirit. In the twentieth century science flourished as never before, but left us with deep misgivings about the human relation to nature. In other centuries, critics complained that humans were alienated from God. In the twenty-first century, critics complain that humans are alienated from their planet. One may set aside cosmological questions, but we cannot set aside global issues, except at our peril. We face an identity crisis in our own home territory, trying to get the human spirit put in its natural place.

The geophysical laws, the evolutionary and ecological history, the creativity within the natural system we inherit, and the values these generate are, at least phenomenally, the ground of our being, not just the ground under our feet. Theologians may wish to demur that, noumenally, God is the ground of being, but "ground" is an earthy enough word to symbolize this dimension of depth where nature becomes charged with the numinous. Life persists because it is provided for in the ecological Earth system. Earth is a kind of providing ground, where the life epic is lived on in the midst of its perpetual perishing, life arriving and struggling through to something higher. Ultimately, there is a kind of creativity in nature demanding either that we spell nature with a capital *N* or pass beyond nature to nature's God. When Earth's most complex product, *Homo sapiens*, becomes intelligent enough to reflect over this earthy wonderland, everyone is left stuttering about the mixtures of accident and necessity out of which we have evolved. But one does not undermine presently encountered values by discovering that it had uncertain origins. We can remain puzzled about origins

while we greatly respect what we now find on Earth, Nobody has much doubt that this is a precious place.

Earth could be the ultimate object of duty, short of God. And if one cannot get clear about God, there is ample and urgent call to reverence the Earth. Whether or not one detects here the brooding Spirit of God, nature has been brooding spirits; we ourselves are the proof of that. And that sets us brooding over our place and our responsibility in this place. In this sense evolution and ecology urge us on a spiritual quest. If there is any holy ground, any land of promise, this promising Earth is it.

Theologians claim that humans are made in the image of God. Biologists find that, out of primate lineages, nature has equipped *Homo sapiens*, the wise species, with a conscience. Ethicists, theologians, and biologists in dialogue wonder if conscience is not less wisely used than it ought to be when, as in classical Enlightenment ethics, it excludes the global community of life from consideration, with the resulting paradox that the self-consciously moral species acts only in its collective self-interest toward all the rest. Biologists may find such self-interest in our evolutionary legacy; but now, superposing ethics on biology, an *is* has been transformed into an *ought*. Ecologists and religious believers join to claim that we humans are not so enlightened as once supposed, not until we reach a more inclusive ethic.

Perhaps ecology is something of a piecemeal science, but that is testimony to how complex, diverse, intricate, open to possibilities the earthen ecosystem network really is; the evolutionary natural history on Earth is quite a "grand narrative," dislike this idea though the postmodernists may. Several billion years worth of creative toil, several billion 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. Ought not those of this sole moral species do something less self-interested than count all the produce of an evolutionary ecosystem resources to be valued only for the benefits they bring? Such an attitude today hardly seems biologically informed (even if it claims such tendency as our inherited Pleistocene urge) much less ethically adequate for an environmental crisis where humans jeopardize the global community of life.

Ecologists and theologians agree: humans need a land ethic. Anciently Palestine was a promised land. Today and for the century hence, the call is to see Earth as a planet with promise.

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