



Science, Religion, and Ecology

Science, with its theories of natural selection and equilibrium, and religion, with its biblical descriptions of land forever flowing with “milk and honey,” have viewed nature as ever-renewing. Both have prioritized growth and its resulting abundance. As our twenty-first-century environmental crises challenge these concepts, scientists can teach us to sustain the environment while the motivations of biblical stewardship remind us to treasure Earth’s biodiversity and celebrate creation.

Life perpetually renewed in the midst of its perpetual perishing: the theme is a common one in both evolutionary natural history and Christian faith. Natural systems have evolved historically and ecosystems have been tested over thousands of years for their dynamic resilience, sometimes remaining stable and at other times undergoing change. As human life evolved, classical monotheism arose with a sense of dwelling in a promised land forever, although biblical writers acknowledged the transience of life. Concern for ecosystem health and integrity have evolved as well. Humans may now stand at a rupture point in history—facing, as some believe, the end of nature. Ecological management, with its scientific focus on preserving nature’s resources and developing technologies, continues the concept of biblical stewardship. A critical question is whether to seek sustainable development or a sustainable biosphere.

A Dynamic, Enduring Earth

Both science and religion, in principle and in practice, face concerns about environmental sustainability. Both world-views encounter an historical dynamism (i.e., forces of change) superimposed on recurring stability. Evolutionary

natural history finds natural selection operating over incremental variations across enormous time spans, with the fittest selected to survive. This drives perennial change as species acquire new skills, exploit new niches, and migrate toward shifting environments.

The theory of punctuated equilibrium, in some contrast, interprets the fossil record as evidence for periods of millions of years of relative stasis, punctuated by relatively brief periods of rapid change. Biologists also speak of evolutionary-stable strategies. Natural selection drives changes, but natural selection fails without enough stability in ecosystems to make the mutations selected for dependably reliable for survival over the immediately forthcoming years. Natural systems were often “sustained” in the past for long periods of time. Critics reject such balance of nature in favor of episodic events, open ecological systems, dynamism and change. Disturbances in the orderly succession of ecosystems produce a patchwork landscape. Ecosystems have various kinds of resilience, but if the disturbances become amplified enough, the stability gets swamped by disorder. Equilibrium and non-equilibrium do represent two ends of a spectrum with real ecosystems somewhere in between, and seeing one or the other can depend on the level and scale of analysis. At the levels of population and species diversity, or community composition, ecosystems can show predictable patterns, approaching steady states on restricted ranges. When unusual disturbances come, they can be displaced beyond recovery of their former patterns. Then they settle into new equilibriums.

The processes and products originally in place will, with high probability, have been those for which organisms are naturally selected for their adaptive fits; misfits go extinct and easily disrupted ecosystems collapse and are replaced by more stable ones. Ecosystems get tested over thousands of years for their resilience. As a result, they have both

stability and dynamic novelty. Many general characteristics are repeated; many local details vary. Patterns of growth and development are orderly and predictable enough to make ecological science possible. This ecosystemic nature, once flourishing independently and for millennia continuing along with humans, has in the last one hundred years come under increasing jeopardy—variously described as a threat to ecosystem health, integrity, stability, or quality.

Classical monotheism arose with a more fixed account of earth structures and processes, set in place at an initial “start-up” creation, and thereafter ongoing with little change. Facing death, as Jacob is “gathered to my people” he blesses Israel: “The blessings of your father are mighty beyond the blessings of the eternal mountains, the bounties of the everlasting hills” (Genesis 49:26, RSV). Life is an ongoing struggle, and therefore hopes arise for the advent of redemption when the Messiah comes, or, for Christians, comes again. But in the course of Earth history, if Israel keeps the commandments, God says, “then I will let you dwell in this place in the land that I gave of old to your fathers for ever” (Jeremiah 7:7).

The sages and prophets knew the transience of life. Consider “a flower of the field”: “the wind passes over it, and it is gone, and its place knows it no more” (Psalm 103:15–16). But they also knew a sustainability and saw, under God, a promised land in which “it might go well with them and with their children for ever” (Deuteronomy 5:29). That certainly sounds like sustainability.

The perpetual cycle of life, which involves renewal in the midst of perishing, is a common theme in both natural evolutionary history and in Christian faith. Both science and religion agree that Earth has long sustained and renewed life, although the classical regeneration of new life out of old on the scale of millennia has expanded to that of billions of years in contemporary science.

Many scientists believe, even in a sustainability crisis, that nature cannot be abolished but nature’s ability to sustain life can be irreparably damaged. Nature has not ended and never will. Humans depend on nature for their life support. Humans use nature resourcefully; they may upset and degrade natural systems. But the natural forces can and will return if humans are taken out of the equation. There is always, once, and future nature.

Other more pessimistic scientists believe that humans on Earth are at a rupture point in history. European-Western civilization is self-destructing, spreading and triggering disruptions—climate change and decreasing biodiversity—around the globe. Until now, the technosphere was contained within the biosphere. Hereafter the technosphere will explode these limits. Earth is now in

a post-evolutionary phase, a post-ecological phase. The next millennium is the epoch of the “end of nature.” The new epoch is the Anthropocene. That puts us indeed at a hinge point of history. What ought we to do to ensure sustainability?

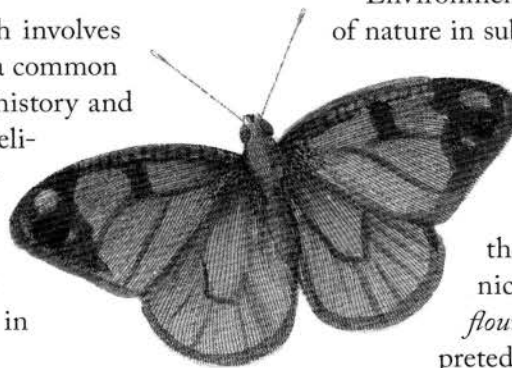
Stewardship and Management

Scientists turning to environmental policy often appeal for ecosystem management. This is attractive to scientists, who see the need for understanding ecosystems objectively and for developing applied technologies, and also to humanists, who desire benefits for people. The combined ecosystem and/or management policy promises to operate at system-wide levels, presumably to manage for indefinite sustainability of ecosystems and their outputs alike.

“Sound scientific management” connects with the idea of nature as “natural resources” and at least permits a “respect nature” dimension, although the question of “manage for what” is often presumed as human benefits. Christian ethicists note that the secular word “manage” is a stand-in for the earlier theological word “steward.” Adam was placed in the garden “to till and keep it” (Genesis 2:15). They may add that “trustee” is a better model than “stewardship,” since stewards are managing in the interests of owners, whereas “trustees” are charged with caring for what is put into their trust.

Environmental science can inform the evaluation of nature in subtle ways. Scientists describe the *order*, *dynamic stability*, and *diversity* in biotic communities. They describe *interdependence*, or speak of *health* or *integrity*, perhaps of these communities’ *resilience* or *efficiency*. Scientists describe the *adapted fit* that organisms have in their niches. They describe an ecosystem as *flourishing*, as *self-organizing*. Strictly interpreted, these are only descriptive terms; and yet often they are already quasi-evaluative terms. Ecology is rather like medical science, with therapeutic purpose, seeking such flourishing health. Theologians may remark that such terms sound like a secular celebration of the *good earth* described in the Genesis parable of creation, or the *promised land* of Israel.

Religion and science have to be carefully delineated, each in its own domain. Asking about technical ecology in the Bible is a mistake (e.g., the Lotka-Volterra equations dealing with population size and carrying capacity). But ecology is a science at native range. Residents on landscapes live immersed in their local ecology. Within the pragmatic ranges of the sower who sows, waits for the seed to grow, and reaps the harvest, the Hebrews knew their landscape. Abraham and Lot, and later Jacob and Esau, dispersed



their flocks and herds because “the land could not support both of them dwelling together” (Genesis 13:2–13, 36:6–8). These nomads were exceeding the carrying capacity, ecologists now say. They knew enough to let land lie fallow in the seventh year for its regeneration.

For sustainability, one needs human ecology, humane ecology, and this requires insight into human nature more so 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. But there must be more. “Hear therefore, O Israel, and be careful to do [these commandments] that it may go well with you, and that you may multiply greatly, as the Lord, the God of your fathers, has promised you, in a land flowing with milk and honey” (Deuteronomy 6:3). It is not the land husbandry or the science, but rather the ethics into which the biblical seers have insight. The deeper claim is that there can be no intelligent human ecology except as people learn to use land justly and charitably. Lands do not flow with milk and honey for all unless and until “justice rolls down like waters” (Amos 5:24).

Limits to Growth

Western religion and Western science have for centuries both joined in pushing back limits. Humans have more genius at this than any other species. We have lived with a deep-seated belief that one should hope for abundance and work toward obtaining it. Christian faith brought “the abundant life”; the DuPont corporation championed “better things for better living through chemistry.” One accentuates the spiritual; the other accentuates the material side of life. Still, science and religion joined to get people fed and sheltered, to keep them healthy, and to raise standards of living.

We have built the right to self-development and the right to self-realization into our concept of human rights. Religious activists and missionaries have fought for that as much as economists and development scientists. But now we have begun to realize that such an egalitarian ethic scales everybody up and drives an unsustainable world. When everybody seeks their own good, aided by applied sciences, there is escalating consumption. When everybody seeks everybody else’s good, urged by gospel compassion, there is, again, escalating consumption. This brings the worry whether either such development science or such compassionate religion is well equipped to deal with the sorts of global level problems we now face. Global threats require that growth be limited in the name of sustainability.

The four main concerns on the world agenda for the new millennium are these: escalating population, escalating consumption, the increasingly horrific consequences of war, and deteriorating environment. Escalating population and consumption are enabled by science, as is the technology for war, and the spillover is a degraded environment. Religions have fostered population growth, or are ambivalent about it; they have enabled human(e) development with increased consumption; they are often ambivalent about environmental conservation. As a result, population, consumption, and environment are not sustainable on our present course. A World Council of Churches theme, “justice, peace, and the integrity of creation,” has focused more attention on conserving population growth and consumption than on saving the environment.

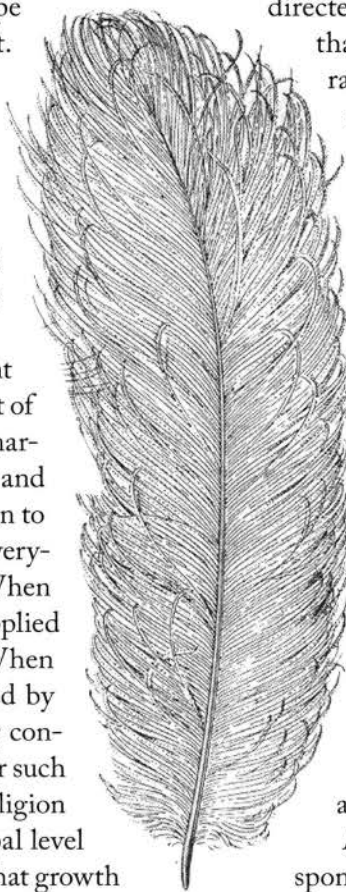
Sustainable Development? Sustainable Biosphere?

The prime model is sustainability, but if one asks what is to be sustained, there are two foci. The favored answer is this: sustainable development. When humans face limits, they need to find growth patterns that can be sustained. Such a duty seems plain and urgent; scientists, developers, social gospel activists, and missionaries can be unanimous about it. Sustainable development is useful just because it is a wide-angle lens, an orienting concept that is at once

directed and encompassing, a coalition-level policy that sets aspirations, thresholds, and allows pluralist strategies for their accomplishment. One needs the best that science can contribute (e.g., genetically modified foods, carbon dioxide monitors, and scientific models and data) and the best that religion can contribute (e.g., agricultural missions, sermons moderating escalating consumerism, etc.).

The underlying conviction is that the trajectory of development is generally right—but the developers in their enthusiasm have hitherto failed to recognize environmental constraints. Scientists can teach us how to sustain the environment, but we will need the motivations of stewardship (and, better yet, trusteeship) to succeed. Economists, who also like to think of themselves as scientists, may remark that a “growth economy” is the only economy theoretically or practically desirable, or even possible. They dislike “no-growth economies,” but now accentuate “green economics.”

A massive *Millennium Ecosystem Assessment*, sponsored by the United Nations, involving over thirteen hundred experts from almost one hundred





nations, begins this way: “At the heart of this assessment is a stark warning. Human activity is putting such strain on the natural functions of Earth that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted” (Millennium Ecosystem Assessment 2005, 5).

But there is another possible focus: “sustainable biosphere.” Ecologists want to insist that “sustainable” is not so much an economic as an environmental term. The Ecological Society of America claims the following: “Achieving a sustainable biosphere is the single most important task facing humankind today” (Risser, Lubchenco, and Levin 1991). The fundamental flaw in “sustainable development” is that it sees the Earth as a resource only.

The underlying conviction in the sustainable biosphere model is that the current “development” trajectory is generally wrong because it will inevitably overshoot, fed by the aspirations of those who always seek to push back limits. The environment is not some undesirable, unavoidable set of constraints to be subdued and conquered with clever technological fixes. Rather, nature is the matrix of multiple values; many, even most of them are not counted in economic transactions. Nature provides numerous other values (e.g., life support, biodiversity, sense of place) that we wish to sustain. The test of a good Earth is not how much milk and honey can be squeezed out of it to drip into human mouths.

A “sustainable biosphere” model demands that the economy be worked out “within” a quality of life in a quality environment—clean air, water, stable agricultural soils, attractive residential landscapes, forests, mountains, rivers, rural lands, parks, wild lands, wildlife, renewable

resources. Decisions about this quality environment will need input from society at large, including its scientists and its peoples of faith. Development is desired, and society must learn to live within the carrying capacity of its landscapes. Even more humans need to treasure Earth’s biodiversity, to celebrate creation. Here science and religion complement each other in teaching us how to sustain the home planet, the Earth with promise, the global promised land.

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