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An ancient concern of theists is what account to give of nature, creation. A recent concern is the extent to which nature has been and continues to be jeopardized, in terms of land health and biodiversity, by human development. Today there are, prominently on the scene, ecotheologians who address both of these concerns with a theology of ecology, or creation care, or a stewardship ethic, or Earth spirituality.

### **Ecology and Human(e) Ecology**

Ecology is a natural science. Theism is a religious conviction. How do the two relate in forming worldviews, especially as these inform lifestyles and shape advocacy? By some accounts, religion and science have to be carefully delineated, each in its own domain. One makes a mistake to ask about technical ecology in the Bible (such as the Lotka-Volterra equations, dealing with population size and carrying capacity). There is no more a Christian ecology than there is a Jewish ecology, a Muslim ecology, or a Buddhist chemistry. Keep the two in separate spheres, like law and poetry.

No, others argue, their total separation is too simple. Ecology is a science at native range. Residents on landscapes live immersed in their local ecology. At the pragmatic ranges of 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.

Still, despite such local knowledge found incidentally in the Bible, monotheists might continue, there are much deeper value issues: wisdom about God and God's will for human life, which is in another domain from ecological knowledge, either the folk ecology of the Bible or the advanced ecology of contemporary science. Ecologists might be able to tell us what our options are, what will work and what will not, what is the minimum baseline health of the landscapes we inhabit. But there is nothing in ecology per se that gives ecologists any authority or skills at making more inclusive environmental policy decisions: how much land to keep wild, how much to reserve for agriculture, how much to keep as working landscapes, how much to develop. How much biodiversity ought we to save, especially if this limits human economic development? Theists might claim that their faith urges both enjoying the abundant gifts of the Earth and saving this creation, with some criteria for judgments (Rolston 1996, 2010).

Ethical monotheists might 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 traditionally been religious, perhaps also philosophical or humanistic. One has to cross a gap to connect facts discovered in Earth sciences with values that humans place on nature when setting environmental policy.

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. 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, the science, but the ethics into which the biblical seers have insight. The deeper claim is that there can be no intelligent human ecology unless 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).

### **Land of Promise/Promised Earth**

Loving the land is a central theme of the Hebrew Bible. Biblical faith is, from the start, a landed faith. Israel is given its "promised land," "a good and broad land, a land flowing with milk and honey" (Exodus 3.8; Deuteronomy 27.3). The land is watched over by God's care:

The land which you are going over to possess is a land of hills and valleys, which drinks water by the rain from heaven, a land which the Lord your God cares for; the eyes of the Lord your God are always upon it, from the beginning of the year to the end of the year.

(Deuteronomy 11.11-12)

The Lord owns the land: "The land is mine" (Leviticus 25.23) and bestows tenure and usufruct (that is, the legal right to use and profit from property that belongs to another) on Israel—their promised land.

Walter Brueggemann takes "land as a prism for biblical faith," claiming that "[l]and is a central, if not *the central theme* of biblical faith" (Brueggemann 1977: 3). "The land" is both geographical and symbolic. Yearning for a sense of place is a perennial human longing, of belonging to a community emplaced on a landscape; and Israel's sense of living on a land given by God, of human placement on the Earth, can yet speak to the landlessness, and lostness, of modern persons. All peoples need a sense of "my country," of their social communities in place on a sustaining landscape they possess in care and in love.

Land is the arable land on which plants can grow and animals can graze (Hebrew: *'adamah*). Land is the terrestrial Earth, brought forth on the third day of creation (Hebrew: *'eres*). Israel's promised land is its corner of a larger garden Earth on which humankind (symbolized in Adam and Eve) have been placed, in primordial time. Words

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translated as "wilderness" occur nearly 300 times in the Bible: uninhabited land where humans are nomads (*midbar*), where animals can be grazed, and wild animals live, or steppe (*'arabah*). Such wilderness is not infrequently the scene of encounter with God, memorably in Jesus' experience (Mark 1).

Both Judaism and Christianity, emerging from Judaism, became more universalist and less land-based. In the Diaspora, the Jews were a people without a country; and, though this was widely regarded as tragic, Judaism remains a faith that transcends residence in Palestine. Christianity has often been regarded as more spiritual and less material, more universal and less provincial than its parental Judaism. Both these movements out of a geographically particular promised land, which are sometimes thought to make the land irrelevant to faith, can as well make every people residents of a divinely given landscape. In that sense, these faiths might have been mistaken, when they became uprooted from encounters with the land. Rather, Christians and Jews ought to have re-rooted in whatever the landscapes of their residence. In this sense, the Jewish vision of a promised land is inclusive, not exclusive.

For example, the American landscape with its majestic purple mountains, fruited plains, its fauna and flora from sea to shining sea, is divinely created, no less than Canaan from the Negev to Mount Hermon. 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" (Muir 1901:331). And landscapes around the globe, east and west, north and south, on six continents (though not the seventh) have provided homelands that peoples can come to cherish and on which they can flourish.

Ancient Palestine was a promised land. Today and for the century hence, ecotheologians now call for peoples globally to see Earth as a planet with promise, destined for abundant life. When Earth's most complex product, *Homo sapiens*, becomes intelligent enough to reflect over this earthy wonderland, nobody has much doubt that this is a precious place. Even 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" (Wilson 2002: 21).

Viewing Earthrise from the moon, the astronaut Edgar Mitchell, was entranced:

Suddenly from behind the rim of the moon, in long, slow-motion moments of immense majesty, there emerges a sparkling blue and white jewel, a light, delicate sky-blue sphere laced with slowly swirling veils of white, rising gradually like a small pearl in a thick sea of black mystery. It takes more than a moment to fully realize this is Earth ... home.

(Mitchell quoted in Kelley 1988, at photographs 42-5)

Mitchell continued, "My view of our planet was a glimpse of divinity" (ibid.). The astronaut Michael Collins recalled being earthstruck: "Earth is to be treasured and nurtured, something precious that *must* endure" (Collins 1980: 6). The land of promise is this planet with promise.

### **Dominion of Man**

"The Lord God took the man and put him in the garden of Eden to till and keep it" (Genesis 2.15). By this account humans are an "Earth-gardener." Humans domesticate Earth. Earth is the scene of creative wildness, but wild Earth needs to be tamed, made

into a garden or park by cultivation. Although paternalism is today rather suspect, the original context of "dominion" (in medieval Europe) was closely related to "*dominus*," the Latin for Father. Humans are an Earth Father. Islam has a similar concept: "I am setting on the earth a vice-regent (*khalifah*)" (Sura 2.30) (see Nasr 1968).

The Hebrews had three different kinds of rulers: prophets, priests, and kings—roles unavailable to non-humans. Humans should speak for God in natural history, should reverence the sacred on Earth, and should rule creation in freedom and in love. Human "responsibility" on Earth is as good a word as human "dominion" over Earth, indeed a better one, for it captures what dominion originally meant in the famous Genesis charge to Adam and Eve, or what it ought to mean: a stewardship over something entrusted into one's care, the prolific Earth with its hordes of creatures brought forth and found to be very good. Some argue that the concept of Earth-gardener needs also to be interpreted as Earth-trustee. A steward manages for the benefit of an owner; a trustee cares for that under his or her care.

There is concern about proper cares from the first chapter of Genesis. God says to the couple: "Be fruitful and multiply, and fill the earth and subdue it; and have dominion" (Genesis 1.27-28). This seems to teach that the role of humans on Earth is to conquer it. That is what humans should care about: ruling over Earth. Famously, historian Lynn White laid much of the blame for the ecological crisis on the Christian belief that humans had dominion over nature, an attack published in *Science* (White 1967). According to White, God's command for humans to "have dominion" flowered in medieval Europe, licensed the exploitation of nature, and produced science and technology to satisfy human cares, and this has resulted in an ecological crisis. So the biblical teaching launches an arrogantly misplaced care on Earth.

Theologians have replied that appropriate dominion requires caring for creation (Berry 2006; Birch et al. (eds) 1990; Cobb 1972; Skillen and Lugo 1998; Nash 1991). True, there is a sense of dominion that means "Earth-tyrant," humans subduing nature in a repressive sense, as a conqueror does his enemy. But there are more positive senses. Even keeping the military metaphor, an "Earth-commander" finds the interests of the commander and the commanded inseparably entwined, like a general and his infantry. There is a salutary biblical view of the just king (Psalm 72), to be contrasted with its opposite, the king who rules with force and harshness (Ezekiel 34.4). Sometimes one encounters the metaphor of a pilot of spaceship Earth.

Theologians were also quick to respond that there were two thousand years between the origins of such belief and these results. Other biblical passages, in Psalms and Job, celebrated creation. Even White noticed that Eastern Orthodox Christianity did not develop such dominion attitudes, nor did St Francis within Western Christianity. Greek convictions were important: "Man is the measure of things" (Protagoras). Other factors played more immediate roles: the rise of capitalism, economies of growth, increasing populations, the rise of democracies, increasing secularization. Liberal capitalist democracy arouses escalating aspirations in its citizen-consumers; by contrast Jesus hardly recommended maximizing consumption.

Yes, Israel was a landed faith, some Christian respondents will concede. But that was Old Testament, not New Testament. Christianity is not a landed faith. Indeed, Christianity is not a worldly faith. Does not Jesus say: "My kingship is not of this world" (John 18.36)? Jesus taught that he is taking his disciples to heaven—a father's house with many mansions. Jesus was taken up into heaven, and at death we leave Earth and go there to be with him.

Jesus did say that his was no worldly kingship. But understanding context is essential. Teaching as he did in the Imperial Roman world, his reference in "this" is to the fallen world of the culture he came to redeem, to false trust in politics and economics, in armies and kings. In the landscape surrounding him Jesus found ample evidence of the presence of God. 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 (Matthew 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. Jesus teaches that the power organically manifest in the wild flowers of the field is continuous with the power spiritually manifest in the kingdom he announces. There is an ontological bond between nature and spirit. This also seems to be connecting the good land, the rural landscape, with deeper natural powers, present also in wild nature.

By classical theist accounts, after the fall and disruption of the garden, nature too is corrupted and life becomes a struggle. Nature needs to be redeemed by human labor. Here theology, science, economics, and morality all joined to think that increasing development, relieving disease and poverty, is a good thing. But the same Genesis stories teach the human fall into sin. Humans covet, worship false gods; they corrupt their faiths, they rationalize in self-deception. Faiths must be ever-reforming; humans need their prophets and priests to constrain their kings. The righteous, humane life balances all three dimensions. Christians have indeed often been too anthropocentric. The need for repentance is perennial (Rasmussen 1996). Dominion on Earth is human destiny, but a fragile destiny. White's article forced serious misgivings about the human dominion of classical and enlightenment Judaism and Christianity.

### **Biodiversity: Genesis and Genetics**

Right at the beginning of the Bible, at the creation, God is interested in Sun, Moon, stars, birds, fish, and animals—before humans are even on Earth. "In the beginning God created the heavens and the earth. 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" (Genesis 1.1). This Wind of God inspires the animated Earth, and "the earth produces of itself (Mark 4.28; Greek: "automatically"). The days of creation are a series of divine imperatives, not so much fiat as commissions: "Let the earth put forth vegetation." "Let the earth bring forth living things according to their kinds" (Genesis 1.11, 24). Biblical faith has the conviction that species originate in God's wish. God ordered Earth to "bring forth swarms of living creatures" (Genesis 1.20). "Swarms" is the English equivalent of the Hebrew word for biodiversity!

Yes, the apex of the creation is man and woman, made of mud, made in the image of God, incarnate and set on their garden Earth. But the world is a habitat also for the myriad creatures—from "great sea monsters" to "birds," "beasts," and "creeping things"—which, repeatedly, God finds "good" and bids them to "be fruitful and multiply and fill" the waters, the earth, and the skies (Genesis 1.20-22). That includes the creepy things, and here we might consider the biologist J. B. S. Haldane's famous remark, when asked by theologians what he had learned about the Creator from studying creation in biology, that God had "an inordinate fondness for beetles" (recalled in Hutchinson 1959).

The fauna is included within the Hebrew covenant. The covenant renewed in the

days of Noah—after a natural disaster with divine provision for saving the wild creatures—is quite specific about this:

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.

(Genesis 9.5)

God said, "This is the sign of the covenant which I make between me and you and every living creature that is with you, for all future generations: I set my bow in the cloud and it shall be a sign of the covenant between me and the earth."

(Genesis 9.12-13)

"Keep them alive with you" (Genesis 6.19). That certainly sounds like God loves wild nature. To use modern terms, the covenant was both ecumenical and ecological. In theocratic Israel, animals belonged to God, as indeed did all property. "For every beast of the forest is mine, the cattle on a thousand hills. I know all the birds of the air, and all that moves in the field is mine" (Psalm 50.10-11). That includes quite a menagerie. In wilderness desert are "fiery serpents and scorpions" (Deuteronomy 8.15; Numbers 21.6), "jackals," "hyenas," "owls," "kites," "ravens," "porcupines," "ostriches," "wild goats (satyrs)," and "wild beasts" (Isaiah 34). Nor does God forget the flora: "The trees of the Lord are watered abundantly; the cedars of Lebanon which he planted" (Psalm 104.16).

Absent humans, God is there, positively blessing such lands:

Who has cleft a channel for the torrents of rain, and a way for the thunderbolt, to bring rain on a land where no man is, on the desert in which there is no man; to satisfy the waste and desolate land, and to make the ground put forth grass?

(Job 38.25-7)

Thou crownest the year with thy bounty; the tracks of thy 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.

(Psalm 65.11-13).

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!

In the Bible wilderness is never a bad thing:

Who has let the wild ass go free? Who has loosed the bonds of the swift ass, to whom I have given the steppe for his home, and the salt land for his dwelling place? He scorns the tumult of the city; he hears not the shouts of the driver. He ranges the mountain as his pasture, and he searches after every green thing.

(Job 39.5-8)

This celebrates an ecology, not simply a promised land.

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Biologists, too, celebrate wildness on the planet, but at this point some biologists will insist that, although Earth is a kind of wonderland, Darwin and genetics have made it untenable to attach any theological perspectives to evolutionary natural history. Evolution is a secular process without any room for monotheist interventions. At this point theologians might reply that the compatibility of genes and Darwin with a theistic perspective is more complex. Biologists and monotheists agree on the genesis of biodiversity, and on escalating complexity. Where once there were no species on Earth, there are today five to ten million. Prokaryotes dominated the living world more than three billion years ago; there later appeared eukaryotes, with their well-organized nucleus and cytoplasmic organelles. Single-celled eukaryotes evolved into multi-celled plants and animals with highly specialized organ systems. First there were cold-blooded animals at the mercy of climate, later warm-blooded animals with more energetic metabolisms. From small brains emerge large central nervous systems.

Biologists continue to debate "progress" in natural history, as well as whether Darwinism has more than a partial explanation for the rise of biodiversity and biocomplexity. What Darwinian accounts insist upon is that there is survival, and the simple survive (microbes, beetles, grasses) as well as the complex (mammals, birds, fishes). The theoretical biologist, John Maynard Smith, concludes: "There is nothing in neo-Darwinism which enables us to predict a long-term increase in complexity," we need "to put an arrow on evolutionary time" but get no help from evolutionary theory (1972: 89). He adds: "It is in some sense true that evolution has led from the simple to the complex. ... I do not think that biology has at present anything very profound to say about this" (1972:98).

If one turns to genetics, one has to admit that genetic mutations are random and dimensions of evolutionary natural history seem accidental. Yet there is more to be said here as well. Those who took physics a century back were taught that there are two fundamental things in the world: matter and energy. Einstein found that matter and energy are different forms of the same thing. Recently many biologists have been insisting that we recognize another metaphysical level: information. That is what is coded in the DNA, a "cybernetic" molecule.

An organism is "informed" about how to make a way through the world, how to cope in its niche. Past achievements are recapitulated in the present, with variations; these results get tested today and then folded into the future. Random mutation figures into a larger generative process; species generate and test new possibilities. The challenge is to get as much versatility coupled with as much stability as is possible. This requires optimizing twin maxima, keeping past knowledge while exploring the nearby search space for better adaptation.

Contemporary geneticists are insisting that to think of this process as "blind" fails to understand what is going on. A more comprehensive perspective interprets plant and animal species as information-processing entities of impressive achievement and adaptive competence. The genes function to conserve life; they also make possible a creative upflow of life struggling through turnover of species and resulting in more diverse and complex forms of life, producing more out of less over millennia.

In what he calls a "21st century view of evolution," James A. Shapiro concludes: "Thus, just as the genome has come to be seen as a highly sophisticated information storage system, its evolution has become a matter of highly sophisticated information processing" (Shapiro 1998: 10 and see 2005). The genome, a reservoir of previously discovered genetic know-how, is both conserving this and constantly generating further

variations (new alleles), tested in the life of the organism (the phenotype). The better adapted (better informed) variants produce more descendants. What is novel on Earth is this explosive power to generate vital information. Monotheists have to accept that this creativity is autopoietic, self-generating (as process monotheists have been insisting for decades). But then the Bible passages cited earlier hardly teach anything different; they say that God bade Earth bring forth of itself these swarms of creatures. Meanwhile the biologists and the monotheists find more complementarity than tension between genesis and genetics.

Monotheists also recall that the Bible can amply celebrate these "red in tooth and claw" dimensions of nature:

Is it by your wisdom that the hawk soars, and spreads his wings toward the south? Is it at your command that the eagle mounts up and makes his nest on high? On the rock he dwells and makes his home in the fastness of the rocky crag. Thence he spies out the prey; his eyes behold it afar. His young ones suck up blood; and where the slain are, there is he.... Shall a faultfinder contend with the Almighty? He who argues with God, let him answer it.

(Job 39.26-40.2)

The high mountains are for the wild goats; the rocks are a refuge for the badgers. ... The young lions roar for their prey, seeking their food from God. ... O Lord, how manifold are thy works! In wisdom hast thou made them all; the earth is full of thy creatures.

(Psalm 104.18-24)

Those roaring lions and blood-soaked eagles are made in divine wisdom. They kill seeking food from God. The non-human creation is wild, outside the hand of man, outside culture. But it is not outside both divine and biological order. That God is personal as revealed in interhuman cultural relations does not mean that the natural relationship of God to lions and eagles is personal, nor should humans treat wild animals as persons. They are to be treated with appropriate respect for their wildness. The meaning of the words "good" and "divine" is not the same in nature and in culture.

### **Earth Ethics: Sustainable Development/Biosphere**

Both theism and ecology find a dynamic, enduring Earth and face concerns about environmental sustainability. Both encounter a historical dynamism 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 during the course of which species acquire new skills, exploit new niches, and track shifting environments. Natural selection drives changes, but natural selection fails without enough stability in ecosystems to make the mutations selected dependably good for immediate years. Natural systems were often "sustained" in the past for long periods of time.

Critics reject this view which privileges the balance of nature and instead emphasize 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



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stability gets swamped by disorder. Equilibrium and non-equilibrium do represent two ends of a spectrum with real ecosystems somewhere in between, and whether one sees one or the other can depend on the level and scale of analysis. At population levels, species diversity, or community compositions, ecosystems can show predictable patterns, and approach steady states on restricted ranges. When unusual disturbances come, they can be displaced beyond recovery of their former patterns. Then they settle into new equilibria.

The processes and products originally in place will with high probability have been those for which organisms are naturally selected for their adaptive fits, since 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, there is 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). Life is an ongoing struggle, and there arise hopes for final 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). They hoped that, in their promised land, "it might go well with them and with their children for ever" (Deuteronomy 5.29). That certainly sounds like sustainability.

Life perpetually renewed in the midst of its perpetual perishing is a common theme in both evolutionary natural history and in Christian faith. Both agree that Earth has long sustained and renewed life, although the classical regeneration of new life out of old on the scale of millennia is expanded to that of billions of years in contemporary science. Many scientists believe, even in a sustainability crisis, that nature is forever lingering around. Nature has not ended and never will. Humans depend on nature for their life support. They might upset and degrade natural systems. But the natural forces can and will return—if one takes away the humans. Nature will always have a past and a future.

Other scientists believe that humans on Earth are at a rupture point in history. European-Western civilization is self-destructing, spreading and triggering disruptions around the globe: climate change, biodiversity loss, soil loss, ecosystem upsets. 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" (McKibben 1989). The new epoch is the Anthropocene (Creutzen 2006). That puts us, indeed, at a hinge point of history. What ought we to do to ensure sustainability?

Scientists turning to environmental policy often appeal to ecosystem management. This appeals alike to scientists, who see the need for understanding ecosystems objectively and for applied technologies, and also to humanists and theologians who desire benefits for people. The combined ecosystem/management policy promises to operate

at system-wide levels, presumably to manage for indefinite sustainability, alike of ecosystems and their outputs. "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 typically answered with the presumption of human benefits. Christian ethicists note that the secular word "manage" is a stand-in for the earlier theological word "steward."

Environmental science can inform the evaluation of nature in subtle ways. Scientists describe the *order*, *dynamic stability*, and *diversity* in these biotic communities. They describe *interdependence*, or speak of *health* or *integrity*, perhaps of their *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 creation parable, or the *promised land* of Israel.

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"; DuPont championed "better things for better living through chemistry." One accentuates the spiritual, the other the material side of life. Still, science and religion joined to get people fed, sheltered, to keep them healthy, to raise standards of living. Christians seek to get people saved from their sins. Moral persons, following the example of Jesus, will also maximize human satisfactions, at least those that support the good life, which must not just include minimal food, clothing, health, and shelter, but some abundance, more and more goods and services that people want. Such growth is always desirable. Economists call such behavior "rational"; humans will maximize their capacity to exploit their resources. After all, the Bible starts out urging humans to "be fruitful and multiply, and fill the earth and subdue it, and have dominion."

Theologians and philosophers have built that into the prevailing concept of human rights: a right to self-development, to self-realization. Religious activists and missionaries have fought for that as much as economists and development scientists. But now such thinkers have begun to realize that this 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 compassionate ethical monotheism is well equipped to deal with the sorts of global-level problems we now face. Global threats require us to limit growth in the name of sustainability.

The four main concerns on the world agenda for the new millennium are: escalating population, escalating consumption, peace and war, 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. As a result, neither population, nor consumption, nor environment is sustainable, on our present headings. A World Council of Churches theme has been "justice, peace, and the integrity of creation," with decreasing effectiveness in that order.

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The prime model is sustainability, but if one asks what is to be sustained, there are two foci. The favored answer is: 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 (genetically modified foods, carbon dioxide monitors and models) and the best that religion can contribute (agricultural missions, sermons moderating escalating consumerism).

The underlying conviction is that the trajectory of development is generally right—only the developers, in their enthusiasm, have hitherto failed to recognize environmental constraints. We can be taught how to sustain the environment by scientists, and we will need the motivations of stewardship to succeed. Economists, who also like to think of themselves as scientists, might 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."

Still, the worries continue about ongoing development. A massive *Millennium Ecosystem Assessment*, sponsored by the United Nations, involving over 1,300 experts from almost 100 nations, begins: "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).

There is another possible focus: "sustainable biosphere." Some ecologists have insisted that "sustainable" is not so much an economic as an environmental term. The Ecological Society of America claims: "Achieving a sustainable biosphere is the single most important task facing humankind today" (Risser et al. 1991: 625). The fundamental flaw in "sustainable development" is that it sees the Earth as 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 (life support, biodiversity, a sense of place) that humans 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, wildlands, wildlife, renewable resources. Decisions about this quality environment will need input from society at large, including its scientists and its Christians, Jews, and peoples of other faiths. 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.

## Related Topics

Chapter 17: Evolution; Chapter 40: Animals

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## Recommended Reading

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- Rolston, H., III (1999) *Genes, Genesis and God: Values and Their Origins in Natural and Human History*, Cambridge: Cambridge University Press. A sustained argument for the view that genetic processes are not blind, selfish, and contingent and that nature is not value-free.