***Teaching Ethics* 8(no. 1, Fall 2007): 1-27.**
Society for Ethics Across the Curriculum

THE FUTURE OF ENVIRONMENTAL ETHICS

Holmes Rolston, III
Colorado State University

Editor's Note: This essay was originally written for publication in *Environmental Ethics: The Big Questions*, Blackwell Press (forthcoming), and printed herein with permission of the author and publisher.

Environmental ethics has a future as long as there are moral agents on Earth with values at stake in their environment. Somewhat ironically, just when humans, with their increasing industry and development, seemed further and further from nature, having more power to manage it, just when humans were more and more rebuilding their environments with their super technologies, the natural world emerged as a focus of ethical concern. Environmental alarms started with prophets such Aldo Leopold, Rachel Carson, John Muir, and David Brower, and have, over recent decades, become daily news.

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, 2005a, p. 5).

The once almost-president Al Gore has turned to leading a campaign to wake us up to the threat of global warming, which he considers the biggest issue facing the world today, repeatedly calling it a moral challenge. John Kerry, the former Democratic presidential candidate, together with his wife, Teresa Heinz Kerry, urge our thinking of *This Moment on Earth: Today's New Environmentalists and Their Vision for the Future* (2007).

Paul Hawken calls environmentalism "the largest movement in the world," considering the number and force of environmental organizations around the globe (Hawken, 2007). If that seems exaggerated, remember that the United Nations Conference on environment and

Development (UNCED) at Rio de Janeiro in 1992 brought together the largest number of world leaders that have ever assembled to address any one issue. That conference drew 118 heads of state and government, delegations from 178 nations, virtually every nation in the world, 7,000 diplomatic bureaucrats, 30,000 advocates of environmental causes, and 7,000 journalists. The issues that coalesced there have been gathering over the last five hundred years, and they will be with us for another five hundred. *Agenda 21*, produced as UNCED faced the 21st century, is perhaps the most complex and comprehensive international document ever attempted (UNCED, 1992a).

All this certainly sounds like the environment is on the world agenda, and also on the ethical frontier, for the foreseeable future. Environmental ethics is, at times, about saving things past, still present, such as whooping cranes or sequoia trees. But environmentalism does not have much future if it is only museum work. Environmental ethics is about once and future nature. Diverse combinations of nature and culture have worked well enough over many millennia, but no more. We face a future without analogy in our past. Our modern cultures threaten the stability, beauty, and integrity of Earth, and thereby of the cultures superposed on Earth. An inter-human ethics must serve to find a satisfactory fit for humans in their communities; and, beyond that, an environmental ethics must find a satisfactory fit for humans in the larger communities of life on Earth.

We worried throughout much of the past century that humans would destroy themselves in inter-human conflict. That fear — at least of global nuclear disaster — has subsided somewhat only to be replaced by a new one. The worry for the next century is that, if our present heading is uncorrected, humans may ruin their planet and themselves with it. American Indians had been on the continent for 15,000 years, but with the coming of the Europeans in 1492 a disruption was imminent. We are living at another of the ruptures of history, worried whether European-Western civilization is self-destructing and, again, triggering disruptions around the globe.

1. CULTURE AND NATURE: MANAGED PLANET? END OF NATURE

Possibly with the ever-increasing transformation of nature, whatever residual nature remains may cease to be of significance for what it is in itself, with value attached more and more to the artifacted characteristics we superimpose on what was once wild nature. There will typically be

degrees of modification: the relatively natural, the relatively cultured — or agri-cultured, the mostly manufactured. Nature is mixed with human labor or industry. Always in the past, continuing in the present, humans have had to rest their cultures upon a natural life support system. Their technosphere was constructed inside the biosphere.

In the future the technosphere could supercede the biosphere. Evolutionary history has been going on for billions of years, while cultural history is only about a hundred thousand years old. But certainly from here onward, culture increasingly determines what natural history shall continue. In that sense, it is true that Earth is now in a post-evolutionary phase. Culture is the principal determinant of Earth's future, more than nature; we are passing into a century when this will be increasingly obvious. The next millennium, some are even saying, is the epoch of the "end of nature." The new epoch is the Anthropocene.

That puts us indeed at a hinge point of history. Let's ask whether we ought to open this door. Henri Bergson, writing early in the last century was prophetic. With the corning of the industrial age, when science joined with technology, we crossed the threshold of a new epoch.

> In thousands of years, when, seen from the distance, only the broad outlines of the present age will still be visible, our wars and our revolutions will count for little, even supposing they are remembered at all; but the steam-engine, and the procession of inventions of every kind that accompanied it, will perhaps be spoken of as we speak of the bronze or of the chipped stone of prehistoric time: it will serve to define an age (Bergson, 1911, p. 146).

The transition from muscle and blood, whether of humans or of horses, to engines and gears shifts, by many orders of magnitude, the capacity of humans to transform their world, symbolized by the bulldozer. The pace change is from horse and buggy to jet plane. Even more recently, the capacity to produce has been augmented by the capacity for information transfer. Consider the transition from handwriting to printing, from communication by written mail to radio and television, from information processing in books to information processing by computers. All this has occurred in a few hundred years, much of it in decades that your parents and grandparents can recall.

In the course of human history, there have been epochal changes of state, such as the transition from hunter/gatherer cultures to agriculture, from oral to written cultures, the discovery of fire, the discovery of iron,

the discovery of the New World, of Earth as a planet to circumnavigate, the discovery of motors, gears, electricity, electronics. This new century will indeed launch a new millennium: the super-industrial age. The high-technology age. The postnatural world? In the future we will have increasingly only "virtual nature." After Teflon, who wants clay?

"We live at the end of nature, the moment when the essential character of the world … is suddenly changing," Bill McKibben worries that already "we live in a postnatural world," in "a world that is of our own making." "There's no such thing as nature anymore" (McKibben, 1989, p, 175, p. 60, p. 85, p. 89).

Michael Soulè faces this prospect:

> In 2100, entire biotas will have been assembled from (1) remnant and reintroduced natives, (2) partly or completely engineered species, and (3) introduced (exotic) species. The term *natural* will disappear from our working vocabulary. The term is already meaningless in most parts of the world because anthropogenic [activities] have been changing the physical and biological environment for centuries, if not millennia. (Soulè, 1989, p. 301).

"Dominate" remains a disliked word, since it has echoes of the abuse of power. But "manage" is still quite a positive term. Humans, now and increasingly, want "ecosystem management," they will say, if ecologists. If religious, they want to be "good stewards." Humans want "sustainable development," they will say, if economists. With so much power and inclination to impose their will on nature, re-making it to their preferences, one does need to ask whether nature will (and ought) increasingly vanish.

Daniel Botkin predicts: "Nature in the twenty-first century will be a nature that we make. [. . .] We have the power to mold nature into what we want it to be." Of course he, like everybody else, urges us "to manage nature wisely and prudently," and, to that end, ecology can "instrument the cockpit of the biosphere." That sounds like high-tech engineering which brings wild nature under our control, remolding it into an airplane that we fly where we please. So it first seems, although Botkin — the ecologist in him returning — does go on to warn that it is important to recognize that "the guide to action is our knowledge of living systems and our willingness to observe them for what they are" and "to recognize the limits of our actions" (Botkin, 1990, p. 192-193, p. 200-201).

J. Baird Callicott puts it this way:

> Nature as Other is over.... We are witnessing the shift to a new idea, in which nature is seen as an organic system that includes human beings as one of its components. . . . A new dynamic and systemic postmodern concept of nature, which includes rather than excludes human beings, is presently taking shape. From the point of view of this new notion of nature, human technologies should be evaluated on their ecological merits (Callicott, 1992, p. 16).

Spontaneous wild nature dies, and what lives on is not such nature *redivivus,* but a transformed, managed nature, a civilized nature, one also, hopefully, with ecological merits.

Before we ask what *ought* to be in the future, we should take a look at what *is* at present. Certainly, nature now bears the marks of human influence more widely than ever before. In one survey, using three categories researchers find the proportions of Earth's terrestrial surface altered as follows: (1) Little disturbed by humans, 51.9%, (2) Partially disturbed, 24,2%. (3) Human dominated, 23,9%. Factoring out the ice, rock, and barren land, which supports little human or other life, the percentages become: (1) Little disturbed, 27.0%. (2) Partially disturbed 36.7%. (3) Human dominated 36,3%. Most terrestrial nature is dominated or partially disturbed (73.0%). Still, nature that is little or only partially disturbed remains 63.7% of the habitable Earth (Hannah, et at, 1994).

In another study, researchers found that humans now control 40% of the planet's land-based primary net productivity, that is, the basic plant growth which captures the energy on which everything else depends (Vitousek, et al., 1986). That is worrisome, but it does leave 60% still in the spontaneously wild. Also, of course, there is the sea, polluted and over-fished, but less affected than the land; and the oceans cover most of the Earth. Lately, scientists have been realizing there is great sub-surface biotic diversity.

The conclusion to draw is not that wild nature is impossible on Earth, but that it is threatened. Much remains, some can be restored. Is it the case, for instance, that, owing to human disturbances in the Yellowstone Park ecosystem, we have lost any possibility of having a "natural" park in the 21st century? In an absolute sense this is true, since there is no square foot of the park in which humans have not disturbed the predation pressures. There is no square foot of the park on which rain falls without detectable pollutants.

But it does not follow that nature has absolutely ended, because it is not absolutely present. Answers come in degrees. Events in Yellowstone can remain 99.44% natural on many a square foot, indeed on hundreds of square miles, in the sense (recalling the language of the U. S. *Wilderness Act)* that they are substantially "untrammeled by man." We can put the wolves back and clean up the air, and we have recently done both. Where the system was once disturbed by humans and subsequently restored or left to recover on its own, wildness can return, Perhaps the Colorado River is a "virtual" river, because it is so managed and controlled that it is no longer wild. But we do not yet have a "virtual Yellowstone," Or even a "virtual Adirondacks." Bill McKibben, who lives in the Adirondacks, in a subsequent book has *Hope, Human and Wild* (McKibben, 1995). Nature in part has ended, yet there is wild hope.

Environmental philosophy invites the inquiry whether we humans can launch a millennium of culture in harmony with nature. After all, the technosphere remains in the biosphere. We are perhaps in a post-evolutionary phase. Not many new species will evolve by natural selection, not at least by such selection unaltered by human changes. But we are not in a post-ecological phase. The management of the planet must conserve some environmental processes, if only for our survival, and it ought to conserve many more, if we are to be wise.

Environmental ethics ought to seek a complementarity. Think of an ellipse with its twin foci. Some events are generated under the control of one focus, *culture,* such events are in the *political* zone, where "polis" (town) marks those achievements in arts, industry, technology where the contributions of spontaneous nature are no longer evident in the criteria of evaluation. At the other end of the ellipse, a *wild* region of events is generated under the focus of spontaneous *nature.* These events take place in the absence of humans; they are what they are in themselves — wildflowers, loons calling, or a storm at sea. Although humans come to understand such events through the mediation of their cultures, they are evaluating events generated under the natural focus of the ellipse.

A domain of *hybrid* or *synthetic* events is generated under the simultaneous control of both foci, a resultant of integrated influences from nature and culture, under the sway variously of more or less nature and culture. "Symbiosis" is a parallel biological word. In the symbiosis zone, we have both and neither, but we do not forget there remain event-zones in which the principal determinant is culture, and other zones in which the principal determinant remains spontaneous nature. We do not want

the ellipse to collapse into a circle, especially not one that is anthropocentric.

Nature as it once was, nature as an end in itself, is no longer the whole story. Nature as contrasted with culture is not the whole story either. An environmental ethic is not just about wildlands, but about humans at home on their landscapes, humans in their culture residing also in nature. This will involve resource use, sustainable development, managed landscapes, the urban and rural environments. Further, environmental ethicists, now and in the future, can and ought to sometimes wish nature as an end in itself. That will prove an increasing challenge.

2. GLOBAL WARNING: " TOO HOT TO HANDLE?"

But wait. There is one human activity that might make everything on Earth unnatural: global warming. Upsetting the climate upsets everything: air, water, soils, forests, fauna, and flora, ocean currents, shorelines, agriculture, property values, international relations, because it is a systemic upset to the elemental givens on Earth. The Intergovernmental Panel on Climate Change, sponsored by the United Nations, meeting in Paris in 2007, released a bleak and powerful assessment of the future of the planet, with near certainty that unprecedented warming is human caused (Intergovernmental Panel on Climate Change, 2007).

John T. Houghton is one of the principal figures in the Intergovernmental Panel on Climate Change, also long a professor of atmospheric physics at Oxford. He was once Director General of the UK Meteorological Office (often called the MET). Houghton jarred political leaders with the claim that global warming already threatens British national security more than global terrorists, and that politicians were neglecting this "one duty above all others…to protect the security of their people" (Houghton, 2003). The heat is first climatological, but secondly economic and political, and in the end moral.

Global warming is a threat of first magnitude and is at the same time "a perfect moral storm," that is, utter or consummate (Gardiner, 2006). The storm is absolute, comprehensive, inclusive, ultimate; there is an unprecedented convergence of complexities, natural and technological uncertainties, global and local interactions, difficult choices scientifically, ethically, politically, socially. There are differing cross-cultural perspectives on a common heritage. There are intergenerational issues, distributional issues, concerns about merit, justice, benevolence, about voluntary and involuntary risk. There is a long lag time, from decades to hundreds

of years. Surely but gradually, local *goods* cumulate into global *bads*. There are opportunities for denial, procrastination, self-deception, hypocrisy, free-riding, cheating, and corruption. Individual and national self-interest is at odds with collective global interests. This is Garrett Harding "tragedy of the commons," now taken at the pitch.[1]

Each person's lifestyle — at home, at work, at leisure, shopping, voting — has an ever-enlarging "ecological footprint," most of all with global warming where effects of our actions are globally dispersed — CO_2 in the air moving around the globe. There is fragmented agency; six billion persons differentially contribute to degrading a common resource (the atmosphere), all persons equally depending on climate, but with radically different powers to affect it. Even in the powerful nations, there is a sense of powerlessness. What can only one do? Any sacrifice I make (paying more for wind power) is more likely to benefit some over-user (heating his trophy home), than it is to better the commons. Institutional, corporate, and political structures force frameworks of environmentally disruptive behavior on individuals (such as high use of cars), and yet at the same time individuals support and demand these frameworks as sources of their good life (they love their SUVs).

The global character makes an effective response difficult, especially in a world without international government, where, for other reasons (such as cultural diversity, national heritages, freedom of self-determination), such government may be undesirable. Some global environmental problems can be solved by appeals to national self-interest, where international agreements serve such national interests. But the damage needs to be evident; the results in immediate prospect (such as with over-fishing agreements, whaling, the Law of the Sea, the Convention on Trade in Endangered Species, or the Montreal Protocol on ozone depleting hydrocarbons). Global warming is too diffuse to get into such focus. Cost-benefit analyses are unreliable in the face of such uncertainties. Who wins, who loses, who can do what, with what result?

Meanwhile we discount the future and shrug our shoulders: we have to look out for ourselves and the future will too. That's the way it has always been. Meanwhile too, the damage is done before we know it and is more or less irreversible.

Generally the developed nations are responsible for global warming, since they emit most of the carbon dioxide. Although global warming affects rich and poor, generally the poorer nations are likely to suffer the most These nations may have semi-arid landscapes or low shorelines. Their citizen farmers may live more directly tied to their immediate land-

scapes. Being poor, they are the least able to protect themselves. They are in no position to force the developed nations to make effective response, particularly with effects on future generations or their or any other landscapes.

Tim Flannery, a scientist named "Australian of the Year" for his work, raises alarm about *The Weather Makers* (2005), fearing a runaway greenhouse effect, where earlier negative feedback processes, tending to keep equilibriuin in atmospheric and ocean circulations, have been replaced by positive feedback processes spinning Earth into disequilibrium where humans will be powerless to halt the process. These may also be called non-linear or cascading shifts. We are smarter than ever, so smart that we are faced with overshoot. Our power to make changes exceeds our power to predict the results, exceeds our power to control even those adverse results we may foresee.

Where mitigating action is possible (such as limiting emissions), the present generation may bear costs, the benefits are gained by future generations. Postponing action will push much heavier costs onto those future generations; prevention is nearly always cheaper than cleanup. But the preventers live in a different generation from those who must clean-up. Classically, parents and grandparents do care about what they leave to children and grandchildren. But this intergenerational inheritance is not so local; it is rather diffuse. Americans gain today. Who pays what costs when, nobody knows. Notice, however, that by 2050, when many of these adverse effects will be taking place, 70% of all persons living on Earth today will still be alive.

Global warming simultaneously affects all life on Earth. Climates have changed in the past. In prehistoric times, with melting ice, species moved north variously from 200 to 1,500 meters per year, as revealed by fossil pollen analysis. Spruce invaded what previously was tundra, at a rate of about 100 meters per year. But plants cannot track climate changes of this order of magnitude. Some natural processes will remain (it still rains on whatever plants are there); but the system is more and more upset.

The plants that can survive tend to be ones that are weedy (kudzu and Japanese honeysuckle). The five hundred wilderness areas will be something like city weedlots, with tatterdemalion scraps of nature that have managed to survive catastrophic upsets. The situation is complex again. Global warming is compounded in effects if there are toxics or pollutants on the landscape, if there are extinctions that upset the ecol-

ogy, or if there is deforestation and soil loss. These multiple factors combine to drive ecosystems across thresholds beyond which they crash.

Is there any hope, human or wild? Whether we have hope will depend considerably on what we think about human nature and our capacities to face an unprecedented crisis.

3. Human Nature: Human Uniqueness vs. "Pleistocene Appetites"

Can we be *Homo Sapiens*, the wise species, as we have named ourselves? We may have engines and gears, but we still have muscle and blood appetites. The next decades will increasingly see tensions between nature and human nature. One might first think that, since humans presumably evolved as good adapted fits in their environments, human nature will complement wild nature. Biologists may call this "biophilia," an innate, genetically based disposition to love animals, plants, landscapes with trees, open spaces, running water (Wilson, 1984).

Critics find this a half truth because disconfirming evidence is everywhere. True, people like a house with a view, with a garden, but they do like a house, a big one. People are builders; their construction industry is what is destroying nature. People prefer culturally modified environments, "Man is the animal for whom it is natural to be artificial" (Garvin, 1953, p, 378). Neil Evernden says that *Homo sapiens* is "the natural alien" (Evernden, 1993). The really natural thing for humans to do (our genetic disposition) is to build a culture differentiating (alienating) ourselves from nature. Human agriculture, business, industry, development consumes most of our lives, and the search for nature is only avocational recreation.

Biophilia might be a positive Pleistocene relic. But other genetic legacies are problematic. Any residual biophilia is weak before our much more powerful desires for the goods of culture. Our evolutionary past did not give us many biological controls on our desires for goods that were in short supply. We love sweets and fats, of which in Pleistocene times humans could seldom get enough. But now we overeat and grow fat. Generally, that is a model for the whole overconsumption problem.

There are few biological controls on our desires to amass goods, to consume; for most people it has always been a struggle to get enough (indeed, for most it still is). When we can consume, we love it, and over-consume. Consumer capitalism transmutes a once-healthy pattern of desires into avarice. With escalating opportunities for consumption,

driven by markets in search of profits, we need more self-discipline than comes naturally. Our self-interested tendencies overshoot; we love ourselves (egoism) and find it difficult to know when and how to say enough.

For all of human history, we have been pushing back limits. Humans have more genius at this than any other species. Especially in the West, we have lived with a deep-seated belief that life will get better, that one should hope for abundance, and work toward obtaining it. Economists call such behavior "rational"; humans will maximize their capacity to exploit their resources. Moral persons will also maximize human satisfactions, at least those that support the good life, which must not just include food, clothing, and shelter, but an abundance, more and more goods and services that people want. Such growth is always desirable.

In the West we have built that into our concept of human rights: right to self-development, to self-realization. Such an egalitarian ethic scales everybody up and drives an unsustainable world. When everybody seeks their own good, there is escalating consumption. When everybody seeks everybody else's good, there is, again, escalating consumption.

Humans are not well equipped to deal with the sorts of global level problems we now face, The classical institutions — family, village, tribe nation, agriculture, industry, law, medicine, even school and church have shorter horizons. Far-off descendants and distant races do not have much "biological hold" on us. Across the era of human evolution, little in our behavior affected those remote from us in time or in space, and natural selection shaped only our conduct toward those closer. Global threats require us to act in massive concert of which we are incapable. If so, humans may bear within themselves the seeds of their own destruction. More bluntly, more scientifically put: our genes, once enabling our adaptive fit, will in the next millennium prove maladaptive and destroy us.

Both policy and ethics will be required to enlarge the scope of concern. Humans are attracted to appeals to a better life, to quality of life and if environmental ethics can persuade large numbers of persons that an environment with biodiversity, with wildness, is a better world in which to live than one without these, then some progress is possible — using an appeal to still more enlightened self-interest, or perhaps better to a more inclusive and comprehensive concept of human welfare. That will get us clear air, water, soil conservation, national parks, some wildlife reserves and bird sanctuaries. Environmental ethics cannot succeed with out this, nor is this simply pragmatic; it is quite true. This may be the

most we can do at global scales, even national scales, with collective human interests.

We may prove able to work out some incentive structures. The European Union has transcended national interests with surprising consensus about environmental issues. Kofi Annan, Secretary General of the United Nations, praised the Montreal Protocol, with its five revisions, widely adopted (191 nations) and implemented, as the most successful international agreement yet, All the developed nations, except the united States and Australia, have signed the Kyoto Protocol. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has been signed by 112 nations. There are over 150 international agreements (conventions, treaties, protocols, etc.) registered with the United Nations, that deal directly with environmental problems (United Nations Environment Programme, 1997; Rummel-Bulska and Osafo, 1991).

Humans have proved capable of advanced skills never dreamed of in our ancient past — flying jet planes, building the Internet, decoding their own genome, and designating world biosphere reserves. It would be tragic in the future if we let our left-over Pleistocene appetites become a useful alibi for continuing our excesses. *Homo sapiens* can and ought to be wiser than that.

4. SUSTAINABLE DEVELOPMENT VS. SUSTAINABLE BIOSPHERE

The United Nations Conference on Environment and Development entwined its twin concerns into "sustainable development." No one wants unsustainable development, so sustainable development is likely to remain the favored model. The duty seems unanimous, plain, and urgent Only so can this good life continue. Over 150 nations have endorsed sustainable development. The World Business Council on Sustainable Development includes 130 of the world's largest corporations.

Proponents argue that sustainable development is useful just because it is a wide angle lens. The specifics of development are unspecified, giving peoples and nations the freedom and responsibility of development. This is an orienting concept that is at once directed and encompassing, a coalition-level policy that sets aspirations, threshholds, and allows pluralist strategies for their accomplishment.

Critics reply that sustainable development is just as likely to prove an umbrella concept that requires little but superficial agreement, bringing a constant illusion of consensus, glossing over deeper problems with a rhe-

torically engaging word. There are two poles, complements yet opposites. Economy can be prioritized, the usual case, and anything can be done to the environment, so long as the continuing development of the economy is not jeopardized thereby. The environment is kept in orbit with economics at the center. One ought to develop (since that increases social welfare and the abundant life), and the environment will constrain that development if and only if a degrading environment might undermine ongoing development. The underlying conviction is that the trajectory of the industrial, technological, commercial world is generally right — only the developers, in their enthusiasm, have hitherto failed to recognize environmental constraints.

At the other pole, the environment is prioritized. A "sustainable biosphere" model demands a baseline quality of environment. The economy must be worked out "within" such 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). Winds blow, rains fall, rivers flow, the sun shines, photosynthesis takes place, carbon recycles all over the landscape. These processes have to be sustained. The economy must be kept within an environmental orbit. One ought to conserve nature, the ground-matrix of life. Development is desired, but even more, society must learn to live within the carrying capacity of its landscapes.

"Sustainable" is an economic but also an environmental term. The Ecological Society of America advocates research and policy that will result in a "sustainable biosphere." "Achieving a sustainable biosphere is the single most important task facing humankind today" (Risser, Lubchenco, Levin, 1991). 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 trajectory of the industrial, technological, commercial world is generally wrong, because it will inevitably overshoot. The environment is not some undesirable, unavoidable set of constraints. Rather, nature is the matrix of multiple values; many, even most of them, are not counted in economic transactions. In a more inclusive accounting of what we wish to sustain, nature provides numerous other values (aesthetic experiences, biodiversity, sense of place and perspective), and these are getting left out. The *Millennium Ecosystem Assessment* explores this in great detail.

A central problem with contemporary global development is that the rich grow richer and the poor poorer. Many fear that this is neither ethical nor sustainable.

> Global inequalities in income increased in the 20th century by orders of magnitude out of proportion to anything experienced before. The distance between the incomes of the richest and poorest country was about 3 to 1 in 1820, 35 to 1 in 1950, 44 to 1 in 1973, and 72 to 1 in 1992 (United Nations Development Programme (UNDP), 2000, p, 6).
>
> For most of the world's poorest countries the past decade has continued a disheartening trend: not only have they failed to reduce poverty, but they are falling further behind rich countries (United Nations Development Programme (UNDP), 2005, p. 36).

The assets of the world's top three billionaires exceed the combined gross national product (GNP) of all of the least developed countries. The richest two percent own more than half of global household wealth (United Nations University., World Institute for Development Economics Research, 2006). The distribution of wealth raises complex issues of merit, luck, justice, charity, natural resources, national boundaries, global commons. But by any standards this seems unjustly disproportionate. The inevitable result stresses people on their landscapes, forcing environmental degradation, more tragedy of the commons, with instability and collapse. The rich and powerful are equally ready to exploit nature and people.

Such issues come under another inclusive term, "environmental justice," Now the claim is that social justice is so linked with environmental conservation that a more fair distribution of the world's wealth is required for any sustainable conservation even of rural landscapes, much less of wildlife and wildlands, environmental ethicists may be faulted for overlooking the poor (often of a different race, class, or sex) in their concern to save the elephants. The livelihood of such poor may be adversely affected by the elephants, who trash their crops. Or it may be adversely affected because the pollution dump is located on their already degraded landscapes —- and not in the backyard (or even on the national landscapes) of the rich. They may be poor because they are living on degraded landscapes. They are likely to remain poor, even if developers arrive, because they will be too poorly paid to break out of their poverty.

Ethicists ought to speak the truth to power. They may suffer for it Joseph E. Stiglitz, Nobel laureate, Chief Economist for the World Bank, became increasingly ethically concerned.

> While I was at the World Bank, I saw firsthand the devastating effect that globalization can have on developing countries, and especially the poor within those countries. . . . Especially at the International Monetary Fund . . . decisions were made on the basis of what seemed a curious blend of ideology and bad economics, dogmas that sometimes seemed to be thinly veiling special interests . . . The IMF's policies, in part based on the outworn presumption that markets, by themselves, lead to efficient outcomes, failed to allow for desirable government interventions in the market, measures which can guide economic growth and make *everyone* better off (Stiglitz, 2002, p. ix, p. xiii, p. xii).

Nor are governments, pushed by such financial interests, always willing so to guide economic growth. Stiglitz wrote in April 2000:

> I was chief economist at the World Bank from 1996 until last November, during the gravest global economic crisis in a half-century, I saw how the IMF, in tandem with the U.S. Treasury Department, responded. And I was appalled (Stiglitz, 2000, p. 56).

For such concern he was pressured into resigning and his contract with the World Bank was terminated. Ethicists need now and forever in the future to remember Lord Acton: "Power tends to corrupt and absolute power corrupts absolutely" (Acton, 1887,1949, p. 364), This reconnects us with the worries we had earlier about those Pleistocene appetites driving humans, rich and poor, ever to want more, more, more.

Sustainable development is impossible without a sustainable biosphere. Thirty percent of the Millennium *Ecosystem Assessment* Development Goals depend on access to clean water. A third of the people on the planet lack readily available safe drinking water. Consider the conclusion of some of its principal authors:

> We lack a robust theoretical basis for linking ecologica1 diversity to ecosystem dynamics and, in turn, to ecosystem services underlying human well-being. . . . The most catastrophic changes in ecosystem services identified in the MA *(Millennium Assessment)* involved nonlinear or abrupt shifts. We lack the ability to predict thresholds for such changes, whether or not such a change may be reversible, and how individuals and societies will respond. . . . Relations between ecosystem services and

> human well-being are poorly understood. One gap relates to the consequences of changes in ecosystem services for poverty reduction. The poor are most dependent on ecosystem services and vulnerable to their degradation (Carpenter, et al, 2006),

People and their Earth have entwined destinies; that past truth continues in the present, and will remain a pivotal concern in the new millennium.

5. BIODIVERSITY: "GOOD FOR ME" vs. "GOOD OF ITS KIND

"The biospheric membrane that covers the Earth, and you and me, . . . is the miracle we have been given" (Wilson, 2002, p, 21). Earth's biodiversity is in more jeopardy today than previously in the history of life. If we do not shift our present development course, "at least a fifth of the species of plants would be gone or committed to early extincction by 2030, and half by the end of the century" (Wilson, 2002, p. 102). The *Millennium Ecosystem Assessment,* reporting a multi-national consensus of hundreds of experts, concluded: "Over the past few hundred years, humans have increased species extinction rates by as much as 1,000 times background rates that were typical over Earth's history" (Millennium Ecosystem Assessment, 2005b, p. 3).

The causes are complex: over-hunting, over-fishing, destruction of habitat, pollution, invasive species, global warming. Measures of loss are multiple: numbers of species, percentages, genetic populations, ecosystems degraded, hotspots lost. Biodiversity (including but more inclusive than "endangered species") is in subspecies, genetically distinct populations, in diverse habitats and ecosystems. Most species on Earth are yet undescribed — so far only about 10% of fungi, and less for most invertebrates and microorganisms. We hardly know what we are losing. Predictions are difficult. Nevertheless, all the measures find biocide quickening in speed and intensity.

Paleontologists trace an evolutionary natural history with ongoing turnover extinctions and replacements. Anthropogenic extinction (caused by human encroachments) is radically different. One opens doors; the other closes them. In natural extinctions, nature takes away life when it has become unfit in habitat, or when the habitat alters, and supplies other life in its place. Through evolutionary time, nature has provided new species at a higher rate than the extinction rate; hence, the accumulated diversity. Life rebounds even after the six catastropic extinctions, which often open up novel opportunities for dramatic respe-

ciation. Artificial extinction shuts down tomorrow because it shuts down speciation. There is no respeciation on Walmart parking lots. Humans dead-end these lines.

But that evolutionary epic is over, critics will say. Most of the species that ever existed in the past are extinct by natural causes, and in the next century more will go extinct by human causes. That may be a pity, but it is inevitable. Nor is it immoral, since humans are worth more than beetles and fungi. We do need to sustain the biosphere, our life support system, as the ecologists were just claiming. So save what is "good for us," but, beyond that, we have no duties to the living things as "goods of their kind." Biodiversity for medical, agricultural, industrial, recreational, scientific uses? Yes, these are instrumental values. But intrinsic value in animals and plants, a "good of their own" that claims our care? That goes too far.

"Human beings are at the centre of concerns . . ." So the *Rio Declaration* begins, formulated at the United Nations Conference on Environment and Development (UNCED), and signed by almost every nation on Earth. This document was once to be called the *Earth Charter,* but the developing nations were more interested in asserting their rights to develop, more ecojustice, more aid from the North to the South, and only secondarily in saving the Earth. The Rio claim is, in many respects, quite true. The human species is causing all the concern. Environmental problems are people problems, not gorilla or sequoia problems. The problem is to get people into "a healthy and productive life in harmony with nature" (UNCED, 1992b).

Wilfred Beckerman and Joanna Pasek put it this way:

> The most important bequest we can make to posterity is to bequeath a decent society characterized by greater respect for human rights than is the case today, Furthermore, while this by no means excludes a concern for environmental developments — particularly those that many people believe might seriously threaten future living standards — policies to deal with these developments must never be at the expense of the poorest people alive today One could not be proud of policies that may preserve the environment for future generations if the costs of doing so are borne mainly by the poorest members of the present generation (Beckerman and Pasek, 2001, p. vi).

That is certainly humane, and no one wishes to argue that the poorest should bear the highest of these costs, while the rich gain the benefits,

We are not proud of a conservation ethic that says: the rich should win, the poor lose. That was what appalled Joseph Stiglitz about the World Bank, the IMF, and the US. Treasury.

But look at how this plays out with World Health Organization policy:

> Priority given to human health raises an ethical dilemma if "health for all conflicts with protecting the environment . . . Priority to ensuring human survival is taken as a first-order principle. Respect for nature and control of environmental degradation is a second-order principle, which must be observed unless it conflicts with the first-order principle of meeting survival needs (World Health Organization, Commission on Health and Environment, 1992, p. 4).

Again, that seems quite humane. But in India this policy certainly means no tigers. In Africa it means no rhinos. Both will only remain in Western zoos. To *preserve,* even to *conserve,* is going to mean to *reserve.* If there are biodiversity reserves, with humans on site or nearby, humans must limit their activities. Else there will always be some hungry persons, who would diminish the reserve. The continued existence in the wild of most of Earth's charismatic endangered species depends on some 600 major reserves for wildlife in some 80 countries (Riley and Riley, 2005). If these are not policed, the animals will not be there.

Michael L. Rosenzweig wants a "win-win ecology" so that "the Earth's species can survive in the midst of human enterprise" (Rosenzweig, 2003). All these you-can-have-your-cake-and-eat-it-too solutions are welcome, so far as they go. A bumper sticker reads: Re-cycling: Everyone wins. That, some say, is an aphoristic model for the whole human/nature relationship. If we are in harmony with nature, everyone wins, equally people, rhinos, and tigers.

The conservatives (the skeptics?) will say that win-win is all that is politically, economically, sociologically, biologically feasible, even imaginable. The best you can do is enlighten self-interest. Remember those Pleistocene urges for more and more. This will be especially true in a free-market democracy, which is what most of the world seems to want today. So the best strategy is to argue that persons living abundant lives need to experience the wonderland natural world (those biophilia instincts). Biodiversity was formerly too much devalued, as if it were nothing but consumable resources. Biodiversity in place benefits people.

Ecotourists who come to see tigers and rhinos will bring in more money than will cutting the timber and grazing cattle there.

Nevertheless, there is something suspicious about these claims. They seem humane; they also hide an arrogance about human superiority. Let's make a comparison. What if Americans were to say: Always prefer Americans, first order. All other nations are second order. "We will not do anything that harms our economy," said George W Bush rather bluntly, "because first things first are the people who live in America" (Bush, quoted in Seelye, 2001). Didn't John Houghton earlier, in his warning about global warming, say that the first duty of political leaders is to protect the security of the people within their nations?

But Houghton did not say that the security of the British is first order, that of the Americans second order. Bush did say that the economic health of the American companies takes bedrock priority. And we are suspicious when one group says to another: We will deal with you only in ways that are first beneficial to us. Maybe we begin to see why Joseph Stiglitz, concerned about the world's poor, was "appalled" by the IMF and U.S. Treasury. None of this bodes well for inter-human justice, much less for inter-specific ethics.

Analogously, what if humans say (as did the World Health Organization): First things first are people. Wildlife, plants, non-humans, second. "You non-humans can live, only if you are worth more to us alive than dead." That is the cash value of the policy: Always prefer humans, first order. The other ten million species on the planet come second to us.

Ought not really superior humans be willing to sacrifice something for these ten (or more) million other species on Earth? There is something morally naive about living in a reference frame where one species takes itself as absolute and values everything else relative to its utility, even if we phrase it that we are taking ourselves as primary and everything else as secondary. If true to their specific epithet, ought not *Homo sapiens* value this host of life as something with a claim to care in its own right? If we humans continue as we are headed and cause extinctions surpassing anything previously found on Earth, then future generations, rich or poor, are not likely to be proud of our destroying "the miracle we have been given" either.

Nobody wants to be a loser, so maybe we can put it this way: Humans will win when, and only when, they change their goals. Humans will come to be corrected from a misperception: "good for us," "instrumental value" is all that counts. We will win because we get our values right. The loser will be worse off by his lights, but his lights are wrong

(nature all and only a resource). If he or she gets things in the right light ("good kinds," "goods of their own," "intrinsic values." "respect for life." "the wonderland Earth"), there is no loss, only gain.

Consider abolishing slavery. Slave-owners lost their slaves as resources. But when the right thing was done, the result was win-win in the long term. Within the next century blacks increasingly prospered and so did the whites. Similarly with the liberation of women or minorities. White males lost some jobs, but the talents and skills of women and blacks, formerly often wasted, now are fully utilized in the work force; family incomes are higher, marriages are richer, and so on. In environmental ethics, there is a parallel. The person re-forms his or her values and becomes a winner because now living in a richer and more harmonious relationship with nature.

At this point, critics will protest that we insist that humans can win but then redefine winning. We win by moving the goal posts. And that's cheating, like showing a net positive balance in your checkbook by revising the multiplication tables. You will win, by losing at the old game and playing a new game. Some persons did lose, in the sense that losing had when our argument started. They lost timber, or jobs, or opportunities for development, or grazing their cattle.

Yes, you do have to move the goal posts to win. That might be cheating if the game is football. But in environmental ethics, there is a disanalogy. You move the goal posts because you discover that they are in the wrong place. And that is really to win, because getting to the wrong goal is not winning. Moving the goal posts, these "losers" at the exploitation game will come to live in a community with a new worldview, that of a sustainable relationship with the biodiverse Earth, and that is a new idea of winning. All they really lose is what it is a good thing to lose: an exclusively exploitative attitude toward nature — similar to that once held about slaves. What they gain is a good thing to gain: a land ethic.

"Every form of life is unique, warranting respect regardless of its worth to man." That is how the UN *World Charter far Nature* begins (United Nations General Assembly, 1982). This charter is as nonanthropocentric as the *Rio Declaration* is anthropocentric. One hundred and twelve nations endorsed this charter, though the United States vigorously opposed it. This statement was largely aspirational; few took it to require any serious changes in policy. But in a vision for the future, we need aspirations. It is possible, we should notice, for humans to be at the center of concerns and also for every form of life to have its worth regardless of humans. Both can be true.

6. EARTH ETHICS

We have been traveling into progressively less familiar ethical terrain. We need a logic and an ethic for Earth with its family of life. Ecosystems are ultimately our home, from which the word *ecology* is derived (Greek: *oikos,* house). In the twentieth century, the commons problem became transnational; at the turn of the millennium it has become global. Our citzenship in nations is not well synchronized with our residence in geographic places, nor with our sense of global dwelling on our home planet.

People are fighting for what is of value in nature but as citizens of nations that have economic policies and political agendas, demanding loyalties in support. Their access to natural resources comes filtered through political and industrial units that are not formed, or continued, with these ecologies in mind. They want resources, but political alignments can often mean suboptimal and unjust solutions to the problems of resource distribution. "Nationalizing" natural resources can be as much part of die problem as part of the answer, especially when the sovereign independence of nations is asserted without regard for the interdependencies of these nations — both those with each other and those of the global ecosystems. When biological resources are taken to be national possessions in dispute, rather than an Earth commons to be shared, it can become difficult to find a way to share them.

In previous environmental ethics, one might have spoken loosely, perhaps poetically, or romantically of valuing Earth. But that would not have been taken as a serious cognitive claim, no more than was the *World Charter for Nature.* Earth is a mere thing, a big thing, a special thing for those who happen to live on it, but still a thing, and not appropriate as an object of intrinsic or systemic valuation. Thinking this way, we can, if we insist on being anthropocentrists, say that it is all valueless except as our human resource.

But we will not be valuing Earth objectively until we appreciate this marvelous (miraculous?) natural history. This really is a superb planet, the most valuable entity of all, because it is the entity able to produce and sustain all the Earthbound values. At this scale of vision, if we ask what is principally to be valued, the value of life arising as a creative process on Earth seems a better description and a more comprehensive category than to speak of a careful management of planetary natural resources that we humans own. Such a fertile Earth, interestingly, is the original meaning of the word "nature," that which "springs forth," "gives birth," or is "generated." This was once explained in the mythology of a "Mother Earth"; now we have it on scientific authority.

Dealing with an acre or two of real estate, perhaps even with hundreds or thousands of acres, we usually think — and perhaps will continue to do so — that the earth belongs to us, as private property holders. Dealing with a landscape, we think that the earth belongs to us, as citizens of the country geographically located there. So we have our nation states with their territories. But on the global scale, Earth is not something we own. Earth does not belong to us; rather we belong to it. We belong on it The challenging philosophical question for the new millennium is how we humans belong in this world, not how much of it belongs to us. The question is not of property, but of community. Biospheric Earth is really the relevant survival unit. And with that global vision, we may want to return to our regional landscapes, and think of ourselves as belonging there too, with a deeper sense of place.

In the next millennium, it will not be enough to be a good "citizen," or a "humanist," because neither of those terms have enough "nature," enough "earthiness" in them. "Citizen" is only half the truth; the other half is that we are "residents" on landscapes. Humans are Earthlings. Earth is our dwelling place. From here onward, there is no such thing as civic competence without ecological competence. Many a citizen who is celebrated for his or her humanity is quite insensitive to the boding ecological crisis, or, even were there no crisis, in enjoying the values the natural world carries all around them. Until that happens, no one is well educated for the next century, the century in which many of these problems will have to be solved — if ever they are solved. Somewhat paradoxically, the two new areas in an undergraduate education, differing from the classical education of the past century is that graduates need to be (1) computer literate and (2) environmentally literate.

Our responsibility to Earth might be thought the most remote of our responsibilities; it seems so grandiose and vague beside our concrete responsibilities to our children or next-door neighbors. But not so: the other way round, it is the most fundamental of our responsibilities, and connected with these local ones. Responsibilities increase proportionately to the level and value of the reality in jeopardy. The highest level that we humans have power to affect, Earth, is the most vital phenomenon of all.

Boutros Boutros-Ghali, speaking as the UN Secretary-General, closed the Earth Summit: "The Spirit of Rio must create a new mode of civic conduct. It is not enough for man to love his neighbour; he must also learn to love his world" (Boutros-Ghali, 1992a, *p,* 1). "We must now conclude an ethical and political contract with nature, with this Earth to which we owe our very existence and which gives us life" (Boutros-Ghali,

1992b, vol. IV, p. 66-69). This does not deny that we must continue to love our neighbors, but it enlarges the vision from a social contract to a natural contract. The challenge is to think of Earth as a precious thing in itself because it is home for us all; Earth is to be loved, as we do a neighbor, for an intrinsic integrity.

Views of Earth from space are the most impressive photographs ever taken, if one judges by their worldwide impact. They are the most widely distributed photographs ever, having been seen by well over half the persons on Earth. Few are not moved to a moment of truth, at least in their pensive moods. The whole Earth is aesthetically stimulating, philosophically challenging, and ethically disturbing. "Once a photograph of the Earth, taken from *the outside* is available … a new idea as powerful as any in history will be let loose" (Fred Hoyle, quoted in Kelley, 1988, inside front cover). We had to get off the planet to see it whole.

A virtually unanimous experience of the nearly two hundred astronauts, from many countries and cultures, is the awe experienced at the first sight of the whole Earth — its beauty, fertility, smallness in the abyss of space, light and warmth under the sun in surrounding darkness and, above all, its vulnerability. In the words of Edgar Mitchell, Earth is "a sparkling blue-and-white jewel . . . laced with slowly swirling veils of white . . . like a small pearl in a thick sea of black mystery" (quoted in Kelley, 1988, at photographs 42-45).

"I remember so vividly," said Michael Collins, "what I saw when I looked back at my fragile home — a glistening, inviting beacon, delicate blue and white, a tiny outpost suspended in the black infinity. Earth is to be treasured and nurtured, something precious that *must* endure" (Collins, 1980, p. 6). Earth is a fragile planet, a jewel set in mystery. We humans too belong on the planet; it is our home, as much as for all the others. Humans are certainly a dominant species — what other species takes pictures of Earth from space? But the glistening pearl in space may not be something we want to possess, as much as a biosphere we ought to inhabit with love. Environmental ethics is the elevation to ultimacy of an urgent world vision. We are searching for an ethics adequate to respect life on this Earth, an Earth Ethics. That is the future of environmental ethics.

NOTES

* A "tragedy of the commons" occurs when individuals, sharing a resource held in common, each act in self-interest and the collective result progressively degrades the collective resource, illustrated by shepherds placing more and more sheep on land held in common (Hardin, 1968).

REFERENCES

Acton, Lord (John Emerich Edward Dalberg-Acton), 1949. *Essays on Freedom and Power,* Gertrude Himmelfarb (ed.). (Glencoe, IL: Free Press).

Beckerman, Wilfred, and Joanna Pasek, 2001. *Justice, Posterity, and the Environment,* (New York: Oxford University Press).

Bergson, Henri, 1911, *Creative Evolution,* Arthur Mitchell (trans.). (London: Macmillan and Co.).

Botkin, Daniel B., 1990, *Discordant Harmonies: A New Ecology far the Twenty-first Century.* (New York: Oxford University Press).

Boutros-Ghali, Boutros, 1992a. Extracts from closing UNCED statement, in an UNCED summary, *Final Meeting and Round-up of Conference,* June 14, UN Document ENV/DEV/RIO/29,14 June.

Boutros-Ghali, Boutros, 1992b, Text of closing UNCED statements, in *Report of the United Nations Conference on Environment and Development,* 1992, vol. IV, p. 66-69. UN Document A/CONF.15L26 (Vol. IV).

Callicott, J. Baird, 1992. "La Nature est morte, vive la nature!" *Hastings Center Report 22* (no. 5, September/October): 16-23.

Carpenter, Stephen R., et al, 2006, "Millennium Ecosystem Assessment: Research Needs," *Science* 314 (13 October) :257-258.

Collins, Michael, 1980, "Foreword," in Roy A. Gallant, *Our Universe.* (Washington, DC: National Geographic Society).

Evernden, Neil, 1993. *The Natural Alien: Humankind and Environment.* (Toronto: University of Toronto Press).

Flannery, Tim, 2005. *The Weather Makers: The History and Future Impact of Climate Change.* (New York: Atlantic Monthly Press).

Gardiner, Stephen M., 2006. "A Perfect Moral Storm: Climate Change, Intergenerational Ethics and the Problem of Moral Corruption," *Environmental Values* 15:397-413.

Garvin, Lucius, 1953. *A Modern Introduction to Ethics,* (Cambridge, MA: Houghton Mifflin),

Hannah, Lee, David Lohse, Charles Hutchinson, John L, Carr, and Ali Lankerani, 1994. "A Preliminary Inventory of Human Disturbance of World Ecosystems," *Ambio* 23:246-50,

Hardin, Garrett, 1968. "The Tragedy of the Commons," *Science* 162 (December 13):1243-1248.

Hawken, Paul, 2007. *Blessed Unrest: How the largest Movement in the World Came into Being and Why No One Saw It Coming* (New York: Viking).

Houghton, John, 2003, "Global Warming is Now a Weapon of Mass Destruction," *The Guardian,* 28 July, p. 14.

Intergovernmental Panel on Climate Change, 2007. *Climate Change 2007: The Physical Science Basis.* Online at www.ipcc.ch.

Kelley, Kevin W, (ed.), 1988. *The Home Planet* (Reading, MA: Addison-Wesley).

Kerry, John, and Teresa Heinz Kerry, 2007. *This Moment on Earth: Today's New Environmentalists and Their Vision for the Future.* (New York: Perseus Group, Public Affairs Books).

McKibben, Bill, 1989, *The End of Nature*. (New York, NY: Random House).

McKibben, Bill, 1995. *Hope, Human and Wild.* (Little, Brown and Company).

Millennium Ecosystem Assessment, 2005a. *Living Beyond our Means: Natural Assets and Human Well-Being: Statement from the Board.* (Washington, DC: World Resources Institute).

Millennium Ecosystem Assessment, 2005b. *Ecosystems and Human Well-being: Biodiversity Synthesis.* (Washington, DC: World Resources Institute).

Riley, Laura, and William Riley, 2005. *Nature's Strongholds: The World's Great Wildlife Reserves.* (Princeton, NJ: Princeton University Press).

Risser, Paul G., Jane Lubchenco, and Samuel A. Levin, 1991. "Biological Research Priorities — A Sustainable Biosphere," *BioScience* 47:625-627.

Rosenzweig, Michael L., 2003. *Win-Win Ecology: How the Earth's Species Can Survive in the Midst of Human Enterprise.* (New York, NY: Oxford University Press).

Rummel-Bulska, Iwona, and Seth Osafo, (eds.), 1991. *Selected Multilateral Treaties in the Field of the Environment, II.* (Cambridge, MA: Grotius Publications).

Seelye, Katharine Q., 2001, "Facing Obstacles on Plan for Drilling for Arctic Oil, Bush Says He'll Look Elsewhere," *The New York Times,* March 30,2001, p. A13.

Soulè, Michael E,, 1989. "Conservation Biology in the Twenty-first Century: Summary and Outlook," in David Western and Mary Pearl, (eds,), *Conservation for the Twenty-first Century.* (Oxford: Oxford University Press).

Stiglitz, Joseph E., 2002, "The Insider: What I Learned at the World Economic Crisis" *The New Republic 22* (no. 16/17, April 17 and 24):56-60.

Stiglitz, Joseph E,, 2002. *Globalization and Its Discontents.* (New York, NY: Norton).

United Nations Conference on Environment and Development (UNCED) 1992a. *Agenda 21*. Document No. A/CONF151/26. http://www.un.org/esa/sustdev/documents/agenda21/index.htm

United Nations Conference on Environment and Development (UNCED), 1992b. *The Rio Declaration,* UNCED Document A/ CONF151/5/Rev. 1,13 June.

United Nations Development Programme (UNDP), 2000. *Human Development Report 2000.* (Oxford, UK: Oxford University Press).

United Nations, Development Programme (UNDP), 2005. *Human Report 2005.* (New York, NY: United Nations Development Programme).

United Nations Environment Programme, 1997. *Register of International Treaties and Other Agreements in the Field of the Environment* (Nairobi: United Nations Environment Programme).

United Nations General Assembly, 1982. *World Charter for Nature,* UN General Assembly Resolution No. 37/7 of 28 October.

United Nations University, World Institute for Development Economics Research, 2006. "The World Distribution of Household Wealth," online at www.wider.unu.edu.

Vitousek, Peter M., Paul R, Ehrlich, Anne H. Ehrlich, and Pamela A. Matson, 1986. "Human Appropriation of the Products of Biosynthesis," *BioScience* 36:368-373.

Wilson, Edward O., 1984. *Biophilia.* (Cambridge, MA: Harvard University Press).

Wilson, Edward O., 2002. *The Future of Life.* (New York, NY: Alfred A. Knopf).

Wolff, Edward N., 2002. *Top Heavy: The Increasing Inequality of Wealth in America and What Can Be Done About It.* (New York, NY: The New Press.

World Health Organisation, Commission on Health and Environment, 1992. *Our Planet, Our Health: Report of the WHO Commission on Health and Environment.* (Geneva: World Health Organization).