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EDITORIAL

Equity, fairness, and the development of a sustainability ethos

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ABSTRACT: Estimates made just before the 21st century indicate that, by the year 2100, Earth may have between 10 and 11 billion people—not quite double the 6 billion population count reached in October 1999. Sustainable use of the planet requires that human needs be met without impairing the integrity of the planet's ecological life support system. This objective will almost certainly require equity and fairness in resource allocation among members of the human species and with natural systems upon which humans depend. For the first time in history, humans have the power to create serious disequilibrium in natural systems at a global level. Nature is not vengeful, but it is opportunistic; new 'equilibrium conditions' are likely to be far less favorable to humans than present conditions. To prevent disequilibrium, a new ethos or set of guiding beliefs regarding human society's relationship with natural systems is essential. The best descriptor of the new ethos is eco-ethics (www.eeiu.org) guided by ethical science and implemented by compassionate, reasoned environmental politics. ESEP, the publication organ of the Eco-Ethics International Union, should be a powerful force in developing the necessary integration of science and value systems while maintaning the integrity of both.

KEY WORDS: Sustainability · Sustainable development · Carrying capacity · Limits to growth · Equity in resource use

To cure a disease, one must first acknowledge it exists.
American Folk Proverb

Eco-ethics

A person reading the professional journals in the fields of economics and ecology might be forgiven for not realizing that both the words economics and ecology originate from the same Greek word. Human societies worship of economic growth has, in the 20th century, increasingly destabilized the global ecology. Clearly, a third component has been neglected – the ethical responsibility of human society to the planet's ecological life support system and the millions of species that inhabit its diverse ecosystems. As Berry (2000) notes: 'if we lack the cultural means to keep incomplete knowledge from becoming the basis of arrogant and dangerous behavior, then the intellectual disciplines themselves become dangerous. 'The purpose of this editorial is to explore some of the ethical problems associated with the quest for sustainable use of the planet. The solutions must be based on ethics in science and environmental politics.

Equity, fairness and sustainable use of the planet

Although intergenerational equity and fairness are the *sine qua non* of sustainable use of the planet, the related issues of equity and fairness for other organisms, the biosphere, and presently living humans have not received adequate attention. Does sustainability imply a greater degree of equity and fairness than now exists or merely maintaining the status quo? The poor consume less than the wealthy and many resources are becoming scarce (e.g., quality freshwater). At what point, if any, should society attempt to discourage over-

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consumption in order to increase planetary carrying capacity of humans or to achieve a greater degree of equitability or fairness? All too often, sustainability focuses on business activities (e.g., sustainable transportation, energy, agriculture, etc.) rather than attempting to develop a global ethos (a set of guiding beliefs) that would shift human behavior in ways that would protect the biospheric life support system and make better use of natural capital (Hawken et al. 1999).

Sustainable use of the planet is often discussed as if it were a new concept. However, some societies had a sustainable relationship with natural systems for thousands of years. From what remains of them today and from early reports of these societies, it is evident that most individuals had an encyclopedic knowledge of the ecosystems they inhabited. In addition, robust evidence indicates that now living individuals, in the Kalahari Desert for example, can accurately construct events of the recent past just by examining animal tracks, scat, and the like.

Another notable feature of sustainable societies was their small per capita ecological footprints [for details of this concept, see Rees (1996)] and the comparatively small differences in material goods and resources consumption per capita. The disparities in personal income (and, thus, access to resources), even in a comparatively wealthy country such as the United States, are not likely to be endorsed by the extremely poor. This situation is not conducive to a societal ethos or shared set of values. An ethos based on fairness and equity regarding human society's behavior within its own and other species seems to be the only possible unifying theme for sustainable use of the planet. Even then it might not happen—stochastic events do occur!

Societies that lived sustainably for thousands of years, presumably by not depleting natural capital, generally expressed a sense of 'oneness' with the universe or environment. This identification or oneness still exists in some societies today—for example, Bhutan (Tashi Wangchuck, personal communication). In contrast, individualism is arguably the dominant view in the world today, although not overtly expressed in some dictatorial societies. In some societies (e.g., United States), individual 'rights' are proclaimed much more frequently than individual responsibility for the greater or universal good. Surely, honoring and respecting the uniqueness of each individual can be achieved without endorsing uncivil, disruptive behavior. Technology and increased affluence cannot, of themselves, negate the bleak characterization of humans (Hobbes 1651) as being dominated by the will for self preservation. Hobbes states that the war of 'all against all' is continual and humans are condemned to a life that is 'solitary, poor, nasty, brutish, and short. 'Profligate use of natural capital (including fossil fuels) plus technology have increased life expectancy, crowded the planet far beyond expectations of Hobbes' time, and provided unprecedented affluence to a minority of the world's population. Even so, humans still inhabit a finite planet and resources are not unlimited. Thus, the will for self preservation must now include a sense of equity and fairness in resource use, including intergenerational relationships. A sustainability ethos must also include preservation and protection of the planet's ecological life support system since no technology exists to replace it.

This desire for development of a sustainability ethos may seem unworldly and utopian. However, the Australian aborigines appear to have lived in a sustainable relationship with their environment for 50 000 years or more. The Bushmen of Southwest Africa have done equally well in a comparatively hostile environment—the desert in which they live (Thomas 1958). In addition, other species have lived sustainably in their environments for incredible spans of time. Tullock's (1994) very readable book on the economics of non-human societies provides some fascinating insights into economies that have existed far longer than human society's. Is it utopian to expect *Homo sapiens* to match the performance of species with tiny brains or no brains at all? To deny the possibility of doing so is to acknowledge that intelligence, as humans define it, has been an evolutionary failure.

Homer-Dixon et al. (1993) have produced a superb analysis of the role that scarcity of natural resources plays in violent conflict (also more recently, Homer-Dixon 1999). An opposing view is that resource scarcities are not limiting to the human species because human ingenuity and technology will provide substitutes (e.g., Simon's views in Myers & Simon 1994). However, no robust evidence exists that resources are infinitely substitutable and, until there is, the precautionary principle mandates preservation and enhancement of natural capital. Even if humans were no longer resource limited, 30+ million other species are. Surely humans have some ethical responsibility toward them (Cairns 1999)! As Campbell (1991) comments about the first evidence of art found in French, Spanish, and North American caves—some dating back to 40,000 years BC—one finds that 'the mystery dimension of man's residence in the universe opens through the iconography of animal messengers. 'As Wilson (1984) notes, humans have biologically based expressions of human dependence on nature for survival of their species. Wilson contends that this dependence is so widespread that it is a universal human characteristic firmly verifiable as innate to the human psyche. Also, Leopold (1949) describes this beautifully in discussing the value of a goose honk.

The tyranny of small decisions

Most people do not realize the cumulative effect that their personal decisions have on the biosphere. Many don't care! With over 6 billion people on the planet, the aggregate impact of millions of similar decisions can have devastating effects on natural systems and personal lives. Odum (1982) remarks on this effect from an ecological viewpoint and, earlier, Kahn (1966) comments from an economic viewpoint. Air pollution in major cities from automobiles is just one of many examples of this aggregate impact of large numbers of identical, individually insignificant decisions.

Human society's economic and technological prowess has engendered the dangerous belief that humans are increasingly free from natural laws that govern other species (Simon 1981). Even in the improbable event that this assumption is valid, there is no assurance that political leaders will not make inept decisions regarding its use. In general, the scientific and technological literacy of political leaders is not high, and this, coupled with an unwillingness to relinquish power, virtually guarantees unfortunate, unadvisable consequences to the general public. Still, there are grounds for hope.

The co-evolutionary basis for sustainability

Raven & Johnson (1986) define co-evolution as 'the simultaneous development of adaptations in 2 or more populations, species, or *other categories* (italics mine) that interact so closely that each is a strong selective force on the other. 'Most people are aware that insects, hummingbirds, and a variety of other creatures are lured to plants in various ways (nectar, aroma, etc.) and transfer genetic material (pollen) to other plants. This co-evolutionary relationship has enormous economic value to human society, which becomes painfully evident when something happens to the pollinators and the major agricultural crops are diminished. Arguably, pests and pesticide manufacturers are in a co-evolutionary relationship since pests develop resistance and the manufacturers develop new products. Antibiotic resistant strains of germs are another example from the field of human medicine. The last 2 examples are important because an intelligent species (*Homo sapiens*) is forced to modify its behavior and practices as a result of changes in a less intelligent species. AIDS is a prime example of this issue.

The situation becomes even more interesting in the *other categories* (italics mine) part of the definition. For example, Schneider & Londer (1984) discuss the co-evolutionary relationship between human society and global climate. Cairns (1994, 1996, 1997) also discusses the co-evolutionary relationship between human society and natural systems. Natural systems are human society's ecological life support system and furnish services (e.g. maintaining atmospheric gas balance). Careless behavior will eliminate many species, but will leave those species that humans cannot control (pests). Humans cannot control the 30-50 million species on the planet, but other species are good at controlling each other. Sustainable use of the planet requires that humans live more harmoniously with all other species since they constitute the life support system.

Enlightened self interest

No species willingly relinquishes resources without getting something in return. In some cases, such as the 'helper' of a mated pair of Florida scrub jays (a bird), what initially appeared to be altruism turned out to produce long-term material benefits that were not immediately apparent to observers. If the individual bird of the same sex as the helper dies, the latter acquires a territory at low cost. For some humans, such relationships may be based on survival of one's genotype or emotional satisfaction. How does the average human benefit from engaging in successful sustainability initiatives? Some illustrative examples follow.

1. Fair and equitable allocation of resources with the human and other species should reduce social unrest, including wars, and keep the planet's life support system functioning dependably.

2. Intergenerational equity and fairness in resource allocation should enhance hope for the future among the young and encourage them to participate in this endeavor.

3. A sustainable planet is the best legacy the older generations can leave for the young. Participation in sustainability initiatives can give more meaning to the lives of the elderly, especially those who have not remained engaged with life and the larger community.

4. Biophilia (love of nature) is basic to human nature (Wilson 1984). Protecting and enhancing the health of nature will simultaneously enhance human health.

5. Beyond a certain minimal level, material possessions do not enhance happiness. Feelings of love, affection, socialization, and compassion are more likely to bring about happiness. Acquiring, maintaining, and guarding material possessions reduces the time available for the activities just mentioned.

6. Compassion for the human and other species is based on a commitment to, respect for, and responsibility for all forms of life. Compassion is not possessive (but the human attitude toward material goods is). Sustainable use of the planet is based on sharing, which enhances societal integrity.

Sustainable development – utopian and vague

When the Brundtland Report (The World Commission on Environment and Development 1987) was first published, I was stunned by its widespread acceptance by some individuals and groups that an uncharitable person might call anti-environmental. On reflection, this acceptance was less surprising because the concept of sustainability is stated in such vague terms that it is more a challenge to the status quo than a well defined, implementable program. Inspired by the Natural Step Program, Cairns (1997b) developed a preliminary set of goals and conditions essential for sustainability. A greatly condensed summary, without discussion of any points, follows (reproduced with permission).

Goal 1

To assure that the machinery of nature has sufficient energy to deliver the necessary ecosystem services.

Condition: Human society shall not co-opt so much of Earth's energy that ecosystems can neither furnish services nor endure for substantial periods of time.

Goal 2

To avoid poisoning or impairing the machinery of nature by altering both the structure and function of natural systems by means of toxicants.

Condition: Substances extracted from Earth's crust or synthesized from raw materials must not be concentrated or dispersed in ways harmful to the biosphere (e.g., metals, oils, or pesticides).

Goal 3

To ensure that ecosystem services, such as the maintenance of atmospheric gas balance, favorable to human and other life forms continue at their present or, preferably, better levels.

Condition 1: The physical and biological basis for the services provided by nature shall not be systematically diminished (e.g., overharvesting whales or fishery breeding stocks).

Condition 2: Artifacts created by human society may not increase systematically on the planet.

Condition 3: A balance must exist between ecological destruction and repair – this is an obvious, almost platitudinous, statement; yet, this concept must be included in public policy.

Condition 4: Management strategies for sustainability must allow natural processes such as succession, evolution, predator-prey relationships, and the like to continue.

Goal 4

To devise a better balance in meeting short-term and long-term 'needs' of human society.

Condition: Short-term human 'needs' may not be met if doing so endangers the planet's ecological life-support system.

Subcondition 1. If a world food shortage develops, grains will be shifted from domesticated animals to humans, rather than conversion of more natural systems to agriculture.

Subcondition 2. Society must not depend on yet-undeveloped technologies to save it from the problems it has created.

Goal 5

To ensure most of Earth's population has the opportunity for a high quality life.

Condition: Human population over the long term must be stabilized at a point at which adequate per capita resources are demonstrably available.

Subcondition 1. When defining sustainable use of the planet, society should use quality of life as the primary criterion.

Subcondition 2. Human 'rights' may not be met if the ecological life-support system is endangered by doing so.

Subcondition 3. The majority of people and countries on the planet must accept a single paradigm on sustainable use of the planet.

Goal 6

To avoid a human-induced episodic environmental catastrophe that would cause much human suffering.

Condition: When employing environmental management strategies about which the precise consequences are still somewhat uncertain, large protective safety margins (i.e., either slowing development or carrying it out extremely cautiously) are essential until the outcome has been better defined and the consequences have been determined to be acceptable and not of significance to long-term sustainability.

Goal 7

To diminish the conflict between generations caused by the perception that future generations will lead impoverished lives because of present greed.

Condition: Older people must become deeply involved in sustainable use of the planet to demonstrate by deeds, not words, the older generation's concern for generations to follow.

Goal 8

To reincorporate all waste from human society into natural systems without damaging their integrity.

Condition 1: Materials that cannot be reintroduced safely into natural systems should not be produced.

Condition 2: Assimilative capacity of natural systems shall not be exceeded.

Condition 3: Robust predictive models must be developed regarding assimilative capacity, and these models must be validated and continually monitored to ensure that previously established quality-control conditions based on these 2 prior activities are being met at all times.

Goal 9

To develop equity and fairness in resources distribution within human society and with other species with which it shares the planet.

Condition 1: A sufficient majority of humans must acknowledge the reality of equity and fairness so that there is an incentive to preserve the ecological life-support system for sustainability.

Condition 2: Ethnic and racial strife must cease so that destructive energy can be rechanneled into constructive activities.

Goal 10

To develop a holistic sustainability initiative.

Condition: Each specific or targeted sustainability initiative (e.g., agriculture, transportation, energy, cites, fisheries) must not act as if it is the only 'flower facing the sun!' It will be difficult to orchestrate these special interests, but otherwise, holistic sustainability will fail.

Cairns (2000) restated these in a more abbreviated ethical context as a declaration of World Peace and Sustainability.

1. Peace among humans is a necessary precursor to sustainability.
2. A harmonious relationship between humans and the biosphere is essential to sustainability.
3. Robust sustainable use of the planet requires human acknowledgment of dependence upon ecosystem services (e.g., maintaining atmospheric gas balance).
4. Ecological damage and repair must be in balance (as a minimal condition).
5. Anthropogenic biotic impoverishment (i.e., species extinction) must cease.
6. Absence of certainty is not synonymous with absence of risk—what we do not know can hurt us badly.
7. No species endures forever—we have an ethical and moral obligation to ensure that efforts to make the planet sustainable for our species does not preclude sustainable use by other species with which we share the planet.
8. Peace with nature requires that humans cease displacing natural systems by constructing artifacts. Failure to do so will destroy our ecological life support system.
9. Nothing is more important than understanding the consequences of human society's destructive potential for both our own and other species and to change our behavior accordingly.
10. Changing existing paradigms requires that concerned individuals confront both policymaker and the general public with scientific information and reasoned argument. Additionally, they must expose them to the vision and ethos required for both peace and sustainability.
11. We must recognize the inappropriateness of the economic growth paradigm for sustainable use of a finite planet and the concomitant importance of limiting resource consumption per individual to enable allocation to future generations.

The precautionary principle

The precautionary principle insists that policy makers move to anticipate problems before they arise or before persuasive scientific evidence of harm is available (Jordan & O'Riordan 1999). The Rio Declaration on Environment and Development (1992) gave the precautionary principle wider visibility to those making international agreements and national legislation. A crucial sentence reads: 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. 'The Swedish Chemicals Policy Committee (1997) took a precautionary approach in their chemicals management model, which focused on sustainability. The treaty establishing the European Community (1993; Article 130:297–299) also takes a precautionary stance. These and other examples direct attention to the need to identify threats to Earth's ecological life support system and to take steps to prevent serious or irreversible harm before it occurs. Given the lofty levels from which these exhortations are issued, one might reasonably expect more implementation to occur. However, the rate of implementation is far too slow in view of the magnitude and diversity of environmental threats likely to develop before 2050. Why is a paradigm shift toward precaution and sustainability not developing more rapidly?

The tyranny of paradigms past

Mainstream science of the 20th century espoused a separation of value judgments and science following the teaching of Decartes & Bacon. Reductionist (primarily laboratory) science has been based on quantifiability, replicability, and statistical significance of results. However, problems at landscape, national, and global levels are multivariate and the outcome is strongly influenced by societal values. Government subsidies (Myers & Kent 1998) is just one of many possible examples. In the United States and many other countries, public policy and associated implementation are more likely, in practice, to protect economic health than environmental and public health. The continuing legal battles about the responsibility of tobacco manufacturers for a range of public health problems is a

good example of the latter. The legal rights of property owners to disrupt the hydrologic cycle in various ways (e.g., dams, destroying wetlands) is another good example of the latter. Endocrine disrupters (Colborn et al. 1996) are a good example that covers both public and environmental health. Predictive ecotoxicology (Cairns & Niederlehner 1995) is still in early developmental stages and, even if it were more advanced, society lacks a philosophy of science that can cope with uncertainties and address issues of equity and fairness in society's relationship with the planet's ecological life support system essential to sustainable use of the planet. United States courts and many other courts of law favor reductionist science, but not integrative (multidimensional) science. Even in cases of reductionist science, such as evidence of harm from tobacco smoke, the burden of proof of harm is not on the manufacturer to any substantial degree, and questions of withholding incriminating evidence abound. The presumption of innocence is fine for humans, but misapplied to corporations and other artifacts of human society.

Equity, fairness, compassion, and an ethos of sustainability

The planet's dominant paradigm fosters technology and economic growth in ways that seriously threaten the health and integrity of the ecological life support system. Sustainability initiatives attempt to redirect economies and technologies in ways that are less environmentally damaging and ultimately enhance and increase natural capital (Hawken et al. 1999). Neither science nor law as presently practiced are likely to result in sustainable use of the planet, although they can contribute much toward this goal. The same comment applies equally well to technology and economics. Without a set of guiding values (ethos), all of these will fail! Central to these guiding values are fairness, equity, and compassion, not only for present and future generations of the human species but for the biosphere and fellow species as well. As His Holiness the Dalai Lama (1998) notes, the purpose of the human existence is to seek happiness (p. 16). He distinguishes seeking happiness from pleasure. He further believes that the pursuit and achievement of personal happiness, thus defined, does not lead to selfishness and self-absorption. Neither is happiness the result of an abundance of material possessions.

Human society may never achieve sustainable use of the planet. There is no universal law that ensures *Homo sapiens* will persist for any particular time span. Despite current paradigms, survival of the human species almost certainly depends more on compassion, equity, fairness, and an ethos of sustainability than it does on science, law, or technology. Humans lived in a long-term sustainable relationship with the biosphere when it had none of these as they are now known. At that time, they had no choice. Few humans could survive if returned to those earlier stages. However, there is much to indicate that present practices are mostly unsustainable. Making them so will require new values and behaviors, and exponential growth shortens the time to make the transition gracefully.

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