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COMPASSION, CATASTROPHE, AND CHANGE

The world is plunging into an energy crisis unlike any before, while geopolitical alliances are shifting quickly and to a degree not seen since the end of the Soviet era, and perhaps not seen since the end of World War II.
Richard Heinberg (2006)

Background

Modern society is based on energy, and its recent evolution has been rapid because of cheap, convenient, readily available energy. Energy availability enabled the small-group species of *Homo sapiens* to change from a few million, spread thinly over the planet, to over 6 billion individuals, mostly in large human artifacts or cities and their suburbs. The energy in an ecosystem available to its biota is one of the most important determiners of carrying capacity. Anthropological evidence shows that humans have been capable of living in a harmonious relationship with natural systems for most of the 160,000 years the species has been on the planet. This relationship does not mean that humans caused no damage; however, the damage has been small and isolated so that ecosystems could recover from it.

However, as Catton (1980) remarks, humans diverted a substantial portion of Earth's life support capacity from supporting other life forms to supporting humans. Moreover, humans have continued to usurp energy since the Agricultural Revolution (which occurred abut 10,000 years ago) so that only a few truly wild systems remain and most of the planet shows some effects of anthropogenic activities. In addition, tools (e.g., bows and arrows, knives) enabled humans to extend their domination over nature, but the tools also changed humans. In an automobile culture, such as the one in the United States, the "tool" actually separates humans from natural systems.

Domestication of wild plants and animals that supported the Agricultural Revolution also gave humans access to energy that was previously less available to them. For example, horses turned grass into transportation or work energy – cattle turned grass into food. However, climate change can result in a reduction in the energy available via these routes.

The process that has enabled humans to produce a 24% ecological overshoot is called *drawdown*. This process can use either nonrenewable resources, such as fossil fuels, or renewable resources, such as old growth forest or top soil, for which regeneration rates are slow. However, this strategy is not sustainable.

Humankind faces an unprecedented opportunity for both success and failure on a global scale. As Heinberg (2005), Diamond (2005), and Tainter (1988) note, many human societies have expanded their power and complexity to remarkable levels only to decline and revert to simpler forms of social organization. Humankind has used every means available to displace other life forms from the areas they once occupied, divert their resources to human use, and deplete natural capital that has taken many years to accumulate. Now the cheap, easily available, convenient energy that made this scenario possible is declining (Heinberg 2005). Alternative fossil sources of energy are available (e.g., coal), but come at a higher environmental cost. Wind and solar power are appealing, but are not yet widely available. Clearly, profligate energy use is rapidly becoming a relic of the past.

Humans have not shown much compassion for other life forms during the process of dominating the planet. Will compassion for other life forms increase or decrease when the era of cheap energy is over? Some foodstuffs (e.g., corn) can be converted to fuel (e.g., ethanol). Will compassion for other members of the human species place food ahead of fuel while some humans are starving or malnourished? Some catastrophes now seem probable. How will compassion for the suffering be expressed in terms of resource allocation? In short, in an era of rapid change, will the manifestations of compassion from humans be appropriate?

Resource Consumption

Concern is mounting about global warming, peak oil, environmental pollution, species impoverishment, and other trends resulting mostly from human activities. The concerns and trends continue because implementation of strategies that would improve prospects for sustainable use of the planet is minimal. Tipping points cannot be precisely predicted until they have occurred, so scientific uncertainty is being cited extensively as a justification for inaction, just as it was cited for the harmful effects of cigarettes decades earlier. However, disequilibrium of the planet's life support system will almost certainly not be reversible. Unless major changes

are made soon in humankind's relationship with the biospheric life support system, catastrophes will occur and hope for leaving a habitable planet for posterity will diminish.

Beginning around 1980, evidence showed that the use of resources by the global economy has outgrown the capacity of natural systems to regenerate them. Almost daily examples of the conflict between demand and supply are in the news media. Worse yet, resources that have taken hundreds of thousands, even millions, of years to accumulate are being consumed in a few centuries. One lesson of history is that the primary indicators of societal decline were ecological, not economic. The ecological overshoot was about 20% in 2002 and appears to be increasing about 1% per year. This situation is not sustainable.

Ecosystem Restoration

Lowering resource consumption to equal the regenerative capacity of natural systems will require monumental management changes of resource extraction and use. Restoring damaged ecosystems will require even more sacrifice, but the health of the economy and the supply of natural capital and the ecosystem services it supplies are closely coupled. Moreover, restoring damaged ecosystems to their pre-damaged condition in an era of ecological disequilibrium will be extremely difficult (Cairns 2006). In fact, anthropogenic climate change and loss of species may make restoration to predisturbance ecological conditions an impossible task. Perhaps humankind should let nature take its course and see what happens. The major risk of this approach is that the new ecosystems will probably not be as beneficial to humans as the ones that were damaged. Worse yet, new ecosystems could be a threat to human society.

Brown (2006) recommends an annual earth restoration budget of US$93 billion. This sum is tiny in view of the amount of restoration needed. At the very least, such a budget would indicate where and under what conditions ecological restoration might meet stated goals. However low the probability is of success, ecological restoration must be attempted, unless failure is virtually certain. Essential to any plan is the determination of which damaged ecosystems are irreversibly damaged, which should recover without restoration efforts, and those for which ecological restoration efforts will make a major difference.

An ecological triage decision would differ from the human medical one in an important respect: ecosystems too damaged to restore to pre-disturbance condition or to recover naturally to that state could be replaced with constructed ecosystems (e.g., Atkinson and Cairns 1993) and created ecosystems (e.g., Atkinson et al. 1993). These naturalistic systems are designed to function under new conditions, and both help accumulate natural capital and provide ecosystem services. These constructed ecosystems will require subsidies and more intensive management, but should increase Earth's carrying capacity appreciably.

Since humankind has typically ignored threats to the biospheric life support system, damaged ecosystems may also be ignored. This scenario is not a good idea since these damaged systems will be colonized by species resistant to human control (called pests). Many pests will emigrate to parts of the surrounding area and probably out-compete and displace many indigenous species, which is not conducive to achieving sustainable use of the planet. If humans have diminished natural capital and the ecosystem services it provides, both must be replaced to whatever degree possible.

These ecological restoration activities are usually accomplished best in a local setting so that citizens can both be part of the effort and protect the improved ecosystem from future damage. This approach is also helpful in developing and demonstrating compassion for other life forms. What a pity that ecological catastrophes are necessary to catalyze these ecologically benign activities.

Compassion for Other Humans

Exponential increases in both human population size and level of affluence have resulted in a global water shortage. Since 1,000 cubic meters (approximately 1,000 tons) of water are necessary to produce a ton of grain, water shortages and food shortages are closely coupled. Populous countries, such as China and India, already have large water deficits, as do Algeria, Egypt, Iran, Mexico, and Pakistan. Their citizens are fellow crew members of Spaceship Earth; surely, political differences can be resolved so that humans can help each other. If human populations are not stabilized, any efforts will be wasted. However, unsustainable practices caused the problem and compassionate help should not allow these practices to continue. Should the United States be given more cheap oil with the hope that the US Congress will develop a comprehensive, sustainable energy policy or the that drivers of automobiles will use energy efficient vehicles?

Since the beginning of my professional career in 1948, action has been postponed because "technology will save us," reason will prevail and the environmentally damaging practices will cease, politicians will fulfill their promises to protect the environment, and polluting industries will become environmentally sensitive. Instead of improving environmentally, the planet is in a precarious situation that may be irreversible. None of my hopes have been realized; many have been shattered. However, is inaction best? No; however, neither are

statements such as “I respect the interdependent web of life if it is not accompanied by major environmental deeds.” Even so, what can be done must be done to protect and restore the environment.

Nation-States in Disequilibrium

Schell (2003) notes that global warming cannot be stopped by B-52 bombers (but they contribute to it) or by nuclear proliferation (pp. 353-354). He notes that peace, social justice, and defense of the environment are a cooperative triad pitted against war, economic exploitation, and environmental degradation. Schell also adds that rejecting war is not enough; humankind must now secure survival by suppressing the menace of annihilation. Second, Schell believes in delimiting sovereignty — when power is cooperative, in the domestic sphere at least, it does not have to be indivisible but can be divided among branches of government and localities (or even eco-regions). Schell states that, if such divisions cannot occur in the international sphere, hope for sustainable use of the planet is doomed. The European Union is a good example of what might be accomplished with hybrid arrangements unimaginable if nation-states base their policies on war. Third, the old unity of state, people, and territory would be dissolved (p. 374).

Gottlieb (1993) feels that the basic components of sovereignty (the state and the nation) might possibly be separated. Given the turbulent relationship between ethnic groups, religions, and other special interest groups worldwide, this separation is unlikely, although it has existed, temporarily, in some sovereign nations. The problem is that humans remain a small-group species and are unable to cope with complex, multivariate political structures. Perhaps human resource distribution issues might be resolved more fairly and equitably if political boundaries were replaced by ecological boundaries and the primary political goal was preservation of carrying capacity based on natural capital and the ecosystem services it provides. The people responsible for the diseconomies and catastrophes would then suffer when their ecological life support system is damaged.

Developing Naturalistic Social Norms

In the 21st century, a rapid evolution of social norms is essential. For cultures such as the United States, in which social norms have been based on a cheap, convenient, readily available source of energy (i.e., petroleum), the rate and degree of change needed will be almost overwhelming. The American automobile culture has let public transportation languish, and urban sprawl has been possible because of the independence automobiles provide. Coal is a possible energy alternative, but it diminishes air quality as well as producing greenhouse gases. Ethanol is an alternative to petroleum products, but may have unattractive input/output energy ratios. Moreover, corn and other foodstuffs are serious contenders as sources of ethanol. Since most of the planet’s arable land is already in use, an “eat or drive” situation could easily develop, especially if climate change (e.g., rainfall patterns, temperatures) diminishes present agricultural productivity. If climate change occurs more rapidly than predicted, as it is in some parts of the world, the consequences will probably be catastrophic. If foodstuffs, such as corn, are diverted to alcohol production for automobiles, the increased demand could force prices well beyond the means of poor and middle-class people. If climate change diminishes the production of corn and other foodstuffs that can be converted to alcohol, prices could soar even more. At present, over a billion people are not adequately nourished, and the additional 3 billion more people who are projected to be added in the 21st century will exacerbate this troubling situation.

If compassion for the poor exists, something should be done to improve their condition. Since most of the population growth is expected in third-world countries, population stabilization at a level compatible with regional carrying capacity is an obvious solution, which means intruding on individual freedom to have large numbers of children. This intrusion would be distasteful to many people. On the other hand, in natural systems, species that exceed the regional carrying capacity simply lose large numbers of individuals to death, starvation, and disease. If humankind is unable to develop social norms that protect the biospheric life support system, should disease, starvation, and death be permitted to limit human population size as they do for other species? In the Pacific arena of World War II, the very heavy casualties resulting from capturing Iwo Jima were considered justified because they saved the lives of so many B-29 bomber crews whose damaged aircrafts would otherwise have been lost at sea. Should the same reasoning be used to protect the biospheric life support system that is essential to a habitable planet for posterity? Should this reasoning be used when the long-term carrying capacity of the planet has been exceeded?

Biospheric Life Support Systems

One colleague correctly pointed out that there is yet no robust evidence that the biospheric life support system is in disequilibrium; however, no robust evidence indicates that its health and integrity have not been impaired. The consequences of the biospheric life support system ceasing to maintain conditions so favorable to humankind are so appalling that precautionary measures to avoid stressing the biospheric life support system

beyond its tipping point are prudent. Paleontological evidence indicates that evolutionary processes eventually restored biological diversity in the past, but not the species that became extinct. Post-disequilibrium conditions may not be as favorable to humans as those at present. From a homocentric viewpoint, precautionary measures are justified even though the precise tipping point of the present biospheric life support system is not known. This tipping point can be determined by continuing present unsustainable practices; however, when the biospheric life support system is in disequilibrium, how will this new knowledge benefit humankind? Evolutionary processes will almost certainly persist (until the sun dies), but individual species, such as *Homo sapiens*, may well suffer major loss of life or even become extinct. Compassion for the other life forms that constitute the present biospheric life support system is a matter of enlightened self interest, as well as an indication of compassion for posterity.

The Limits of Compassion

The daily news is a constant reminder that catastrophes occur continuously, even though, fortunately, most are regional rather than global. Responding to each in a meaningful way would produce an emotional overload in most people. In fact, many people studiously avoid the bad news and only welcome the good news. Of course, denial of or avoidance of problems usually results in delaying the solution of the problem. However, so does taking on too many problems at once so that none gets the attention needed for solution.

With an exponentially increasing human population, increasing ecological overshoot, global warming, and other types of climate change; peak oil; and inadequate supplies of fresh water, exceeding a number of ecological and societal tipping points in the 21st century would not be astonishing. Since the exact location of these tipping points will not be known until they have been passed, each catastrophe will be a surprise. Of course, if an urgent, major global effort were made to first arrest and then reverse these unsustainable trends (remembering ecological overshoot), these thoughts could be dismissed as idle speculation. However, no credible signs indicate that this trend is happening at the global level. Worse yet, so little has been done that even inadequate measures may look good to the general public and, thus, delay effective remedial action. Some illustrative questions related to these issues follow.

1. Will compassion for the biospheric life support system be adequate to ensure its health and integrity so that conditions favor *Homo sapiens*?
2. Can humans adapt to rapidly changing social and ecological conditions so that species survival is likely?
3. Will humankind have sufficient compassion for posterity to withhold aid to populations that persist in having social norms that are unsustainable?
4. Will resource wars, both military and economic, be the primary determinant of allocation of finite resources on a finite planet?
5. Will resources be used sustainably?

In natural systems, finite resource problems are “solved” in ways repugnant to most humans — mass deaths, starvation, disease, etc. Since humankind credits itself with intelligence, creativity, and compassion, one might reasonably expect more from this species than a 24% ecological overshoot, exponential population growth, excessive anthropogenic greenhouse gases, and resource wars. The basic question is not how to meet human “needs” and expectations, but how to live sustainably so that the biospheric life support system continues to maintain conditions that are so favorable to humans. Otherwise, humans will become a transient species like those that preceded it over billions of years.

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