CHAPTER 25

POSTPONING THE QUEST FOR SUSTAINABILITY: SURVIVAL FIRST – THEN SUSTAINABILITY

I've given up on the whole human species. I think a big, good-sized comet is exactly what this species needs. You know, the poor dinosaurs were walking around eating leaves, and they were completely wiped out. Let the insects have a go. You know, I don't think they'll come up with sneakers with lights in them, or Dust Busters, or Salad Shooters, or snot candy . . . I only wish there were some way I could live out on the moon and watch it all on CNN . . . I just want to describe the mess. But life is dual. If you scratch a cynic, you'll find a disappointed idealist.

George Carlin, The Progressive, July 2001

It ain't over til it's over. Yogi Berra

I rejoice to live in such a splendidly disturbing time. Helen Keller

Humankind's reckless use of fossil energy has created a situation in which Planet Earth is in imminent peril (Hansen et al. 2007). Lovelock has stated that climate change is already insoluble, and life on Earth will never be the same again (The Independent 2007) and that billions will die this century (Bloomberg 2006). I have decided that humankind is creating an alien planet (Cairns 2007a). Heinberg (2005, p. 31) predicts the loss of over 3 billion people by 2200 as a result of passing peak oil. All the above predictions could be wrong, but the preponderance of evidence indicates that rough times are already here and almost certain to become worse – hardly the conditions for achieving sustainable use of the planet. Still, both social and environmental stability may again be achieved and provide another opportunity to engage in a quest for sustainable use of the planet.

For decades I was convinced that sustainable use of the planet was not only highly desirable, but others, if they saw the same evidence I have seen, would feel an equally strong motivation to work toward this end. However, this outcome has not happened, and, now, persuasive (although not conclusive) evidence indicates that some important ecological thresholds and breakpoints have been crossed. Since greenhouse gas emissions are still increasing and peak oil either has passed, or soon will pass, the situation is likely to worsen. This worsening is both because of the long residence time of carbon dioxide in the atmosphere and because of the effects of the loss of cheap, abundant petroleum upon technological societies.

The Bad News

One can easily become depressed about the future of humanity. Some recent incidences point to the continuing lack of attention to mainstream science and its conclusions. In the United States, a young man, with no scientific credentials and not even a BS degree (he has since obtained one), was assigned the responsibility of checking the research publications on global heating that was authored by a world-class scientist (James Hansen). The US Senate attempted to honor Rachel Carson, author of the paradigm shifting book *Silent Spring*, on her 100th birthday, but Senator Tom Coburn (Rep., Oklahoma) objected (Zabarenko 2007). Senator James Inhofe (Rep., Oklahoma) has repeatedly called global heating science the greatest hoax ever perpetuated on the American public. US President George Bush has refused to even discuss limiting greenhouse gas emissions. In my hometown of Blacksburg, Virginia, some people drive alone to "save the environment" meetings in gas guzzling sport utility vehicles. The list goes on and on. The contrast of the United States with what many European nations are doing to reduce greenhouse gas emissions is shocking, especially

since Europeans are leading quality lives while attempting to protect both posterity and natural systems.

The Good News

The New Economics Foundation Report (NEF 2006) provides persuasive evidence that life satisfaction/happiness is not highly correlated with material possessions or profligate use of energy. Hawken (2007, p. 184) states:

> *It has been said that we cannot save our planet unless humankind undergoes a widespread spiritual and religious awakening. In other words, fixes won't fix unless we fix our souls as well. So let's ask ourselves this question: Would we recognize a worldwide spiritual awakening if we saw one?*

Will Reason Prevail?

One of the US founding fathers, Thomas Jefferson, described the American political experiment as follows: "Which we trust will end in establishing the fact, that man may be governed by reason and truth. Our first object should therefore be, to leave open to him (the citizen) all the avenues to truth" (Gore 2007, p. 100). However, Gore noted (2007, p. 13): "Five years after U.S. President Bush first made his case for an invasion of Iraq, it is now clear that virtually all the arguments he made were based on falsehoods." Gore further noted (2007, p. 104): "We were told that the president would give the international system every opportunity to function, but we now know that he allowed the system to function only briefly as a sop to his secretary of state and for cosmetic reasons." The reason for including this information on the falsehoods that put the United States in the Iraq war is that, arguably, the greatest threat to human security is global heating and other types of climate change, not terrorists or the "aggression" of other nations. Terrorists have killed thousands of people, but rapid climate change will probably damage the agricultural system's production of foodstuffs and will kill or harm millions.

Not surprisingly, Monbiot (2007) has found falsehoods in the global heating debate. For example, he cites examples of alterations of climate scientist James Hansen's US Congressional testimony in 1988 by Patrick Michaels, who deleted the "most plausible" and the "least damaging" scenarios presented by Hansen. Events have shown the middle scenario ("most plausible") correct. Unlike Cockburn (2007), who provided no references in his column attacking peer review, Monbiot provides 14 references for his short commentary and asked Cockburn, "Where are the (your) references?" Monbiot's other major example of falsehoods was a denial by a former president of the US National Academy of Sciences, Frederick Seitz, that manmade climate change is happening. The document, known as the "Oregon Petition," maintained that the production of extra carbon dioxide was good for the planet (can be read at http://www.desmogblog.com/files/IREA-memo.pdf). The Council of the National Academy made clear that the report does not reflect the conclusions of expert reports of the Academy (Council of the National Academy of Sciences 1998). Gore (2007, chapter 4) gives a collection of "convenient untruths" that defy reason.

Global Tipping/Breakpoints

A tipping point/breakpoint occurs when a system is so stressed that it goes into disequilibrium. Eventually, a new equilibrium point may be established, but it is unlikely to closely resemble the original one. The driving force pushing toward these multiple tipping points of complex ecological and societal systems is global human population increase. The human population has quadrupled in just one century, as if humankind lived on an infinite rather than a finite planet (http://www.overpopualtion.net). Even the present population will not be sustainable after peak oil. Both climate change and ocean acidification are the result of anthropogenic greenhouse gas emissions, and both are the result of fossil fuel combustion by humans and, therefore, under their control. The goal, of course, is to stabilize the world population at a

sustainable level, taking into account the probability of reduced agricultural production due to both climate change and less petroleum for fertilizer and mechanized agriculture. One fantasy in the United States is that biofuels will replace petroleum, but, as Grant (2007, p. 15) notes: "It might take roughly 350 million hectares – equal to one-quarter of the world's arable land – to replace something like 5 percent of the present world fossil energy production." This situation is reminiscent of the period when about one-quarter of US cropland a century ago was used to raise draft animals (Grant 2007, p. 27).

Living in a Low Energy Society

I was born on May 8, 1923 – a year in which the US population was 111,947,000 – just over one-third of the 300+ million at present. In winter, my family's small, semi-detached home was kept cool (about 65ºF) by today's standards. We had one radio, no telephone, and my father used the family car for business, but we did take short trips (about 20 miles) on some Sundays to visit relatives. I walked to school each morning, back home for lunch, and returned when school closed – one-half mile each way. Well beyond the edge of town was Potts Quarry, my favorite fishing site. A 10-minute bike ride would get me there. The Schuylkill River, polluted but with fish, was one mile away. Summer vacations (two weeks for my father) were spent at Somers Point, New Jersey – about 75 miles away. My boyhood included the US Great Depression, which fostered some common advice:

Wear it out
Use it up
Make it do
Do without.

My companion Jeannie stitched a piece of burlap, at our daughter Karen's request, with these words in different colors.

Neither Jeannie nor I had a desire to have many material possessions and never felt deprived without them. Humankind's low energy era will doubtless be different since the human population is much larger now than it was then. The amount of arable land has not increased, but highly mechanized agriculture and agricultural research have made population increases possible. The end of cheap, abundant energy, combined with rapid climate change, will decrease production of foodstuffs so the era of cheap, abundant food will soon be over, as will the era of cheap, abundant material goods. However, social capital (interactions with other humans) should return to the higher level of the low per capita energy era. In short, an era of low, but efficiently used, per capita energy could be much better than many people think it could.

Ecological Overshoot

Ecological overshoot is using resources more rapidly than they are being regenerated. Inhabitants of the United States and, to a lesser extent, other developed countries tend to view the planet as a vast cornucopia that can spew forth endless foodstuffs, material goods, and cheap gasoline. This point of view was reinforced by perpetual economic growth economists (e.g., Simon 1981) who believed that, when a resource was depleted, human ingenuity and creativity would provide a substitute. Simon (Myers and Simon 1994) was sufficiently optimistic to state: "We now have in our hands the technology to feed, clothe, and supply energy for the next seven billion years." In 2007, this statement sounds overly optimistic. Although Simon's views received strong endorsement from some of the financial news media, contrary views existed (e.g., Boulding 1966; Orr and Ehrenfeld, 1995). Weston (1995) notes that people often attempt, in the race to "do something," to solve a problem without understanding its philosophical and technical elements. This strategy often leads to failure, miscommunication, and delay in real progress. This approach is quite evident in the effort to replace petroleum with biofuels, coal, and nuclear energy. To replace the resources lost by ecological overshoot, the remaining resources must be used more effectively. The tendency to avoid energy conservation by basing hopes on unproven technologies is more than matched by the apathy displayed in coping with the rapidly accelerating global heating crisis. Lean

(2007) notes that carbon dioxide emissions have been rising at three times the rate of the 1990s. Lean's observation was based on a report of the US National Academy of Sciences, which indicated that carbon dioxide emissions have been increasing by about 3% per year in this decade compared with 1.1 % per year in the 1990s. Connor (2007) discusses the effects of increased greenhouse gas emissions in Antarctica. He notes that fears that global sea level rise may be faster and further than expected are supported by a study showing that 300 glaciers in Antarctica have begun to move more quickly into the ocean. Despite the serious nature of these events, Heilprin (2007) reports that the administration of US President George Bush is drastically scaling back efforts to measure global heating from space, just as President Bush tries to convince the world the United States is ready to take the lead in reducing greenhouse gases (Revkin 2007). At the Group of 8 Meeting, US President Bush effectively derailed a climate change initiative that was backed by Chancellor Angela Merkel of Germany (Stolberg 2007). When attempting to address a global problem, such as climate change, common goals and time lines are essential. Otherwise, validation of various approaches favored by different nations or groups of nations will not be possible. Orr (2000) stated:

> *No person, institution, or nation has the right to participate in activities that contribute to large-scale irreversible changes of the earth's biogeochemical cycles or that undermine the integrity, stability, and beauty of its biotic systems; the consequences of such activities would fall on succeeding generations as an irreversible form of remote tyranny.*

Accepting Limits

Living sustainably requires both accepting limits and living within them. Wackernagel et al. (2002) have provided persuasive evidence that, in 2002, the ecological overshoot was 24%. This figure demonstrates clearly a massive failure to accept limits. Such an ecological overshoot is stealing from future generations, which living sustainably seeks to prevent. Sustainable use of the planet aspires to connect the future to the present. As Hardin (1993, p. 111) states: "Binding the future to the present makes sense only if understandable mechanisms connect the two." How did humankind get into a situation where its entire future rests upon its response to global heating and peak oil? Humankind arrived at this situation through numerous possibilities, but a few stand out.

Failure to establish a default status

Hardin (1993, p. 40) uses as an example the process of determining guilt. Evidence that leads to one conclusion is common in the United States or England – in default of absolute knowledge, a conclusion is based on the premise of "Innocent until proven guilty." In France (Napoleonic Law), the rule is "Guilty until proven innocent." Hardin's essential point is that one or the other default positions must be embraced since absolute proof can rarely be demanded, particularly with complex, multivariate issues such as global heating and peak oil. In science, the default position is the preponderance of evidence. Regrettably, the US political system has focused on the uncertainties of science, which, on global problems, will always exist. This situation has seriously, possibly fatally, delayed major remedial action.

Loss of faith in the power of reason

In his book "The Assault on Reason," former US Vice-President Al Gore (2007, p. 1) quotes a comment of US Senator Robert Byrd (West Virginia) on the Senate floor just before the United States launched the invasion of Iraq:

> *This Chamber is, for the most part, silent – ominously, dreadfully silent. There is no debate, no discussion, no attempt to lay out for the nation the pros and cons of this particular war. There is nothing. We stand passively mute in the United States Senate.*

Gore notes that Byrd was really voicing a question that millions of American citizens have been asking: "Why do reason, logic, and truth seem to play a sharply diminished role in the way America now makes important decisions?"

One reason is that persons in positions of power make statements that are not based on reason, evidence, and logic. For example, Holtz-Giménez (2007) calls attention to the assumption that the term *biofuels* evokes the image of a clean and inexhaustible, renewable energy, confidence in technology, and a power of progress compatible with the lasting protection of the environment. Holtz-Giménez (2007) uses easily obtainable information to show that the expectations of biofuels for the future are not likely to be realized: ". . . the attraction of these biofuels resides in the fact that they might prolong the oil-based economy . . ." Biofuels also offer the temptation to continue the present, energy profligate, high energy consumption lifestyle. Energy conservation does not appear to be a major component of this appeal.

Arguably, the worst misleading statements were related to economics. Julian Simon's statement on growth even had a time frame – 7 billion years. Anyone with the slightest familiarity with exponential growth realizes that perpetual growth in population or resource consumption on a finite planet is impossible. However, Simon's publications and views were widely disseminated by the financial news. Hardin (1993, p. 190) provides some illustrative statements from some notable people in the financial world.

> *Prosperity has no fixed limits. It is not a finite substance to be diminished by division. On the contrary, the more of it that other nations enjoy, the more each nation will have for itself.*
>
> Henry Morgenthau, US Secretary of the Treasury, 1933

> *I cannot conceive a successful economy without growth.*
>
> Walter Heller, US President's Council of Economic Advisors, 1962

> *The existing propensities of the population and polices of the government constitute claims upon GNP itself that can only be satisfied by rapid economic growth.*
>
> US President's Council of Economic Advisors, 1971

> *Never has growth been more important. You can never feed the poor or ease the lives of the wage-earning families, ameliorate the problems of race or solve the problems of pollution without real growth.*
>
> John B. Connally, US Secretary of the Treasury, 1972

However, contrary opinions have been voiced by leaders:

> *In a finite world, high growth rates must self-destruct. If the base from which growth is taking place is tiny, this law may not operate for a time. But when the base balloons, the party ends: A high growth rate eventually forges its own anchor.*
>
> Warren E. Buffet, one of America's most successful investors, 1990

A tendency exits to demonize or at least place blame on the erring prophets who "mislead" us, but actually the blame is ours for not requiring evidence, identifying the default position, or, at the very least, determining if the reasoning is suitable for a finite planet with finite resources. If the concept is very attractive, we should be even more cautious.

We're Warned: Out of Gas

In June 2007, the Special Investigations Unit of Cable Network News (CNN) aired a number of times a 1-hour documentary with the above title. The basic message was that the world supply of petroleum is finite and delivery to users could suffer major disruptions from hurricanes or sabotage. Years ago, physicist J. H. Fremlin (1964) asserted that perpetual economic growth required a perpetual increase in humankind's use of energy. Once fossil fuels (ancient sunlight), especially petroleum and natural gas, become increasingly scarce, humans will have to depend increasingly on energy from sunlight (e.g., wind, solar, biofuels) (Cairns 2007b) or nuclear energy, which has severe disadvantages. For example, Elash (2007) reports that France may have to reduce output or shut down 17 of its 58 nuclear power plants. She quotes David Lochbaum, Director of Nuclear Safety at the US-based Union of Concerned Scientists: "People say that nuclear power is going to solve global warming, but I think we're going to have to solve global warming if we're going to have a future for nuclear power." Have we no regard for posterity and the other life forms with which we share the planet? How can we break this deadly lifestyle?

First, Do No Harm

The ancient Greek father of medicine Hippocrates provides the above standard for those entering the practice of medicine, and humankind should have taken that oath with regard to Earth before fossil fuels were discovered. However, the dominant "solutions" to our present problems are "more of the same" – that is, the profligate use of energy will continue. So, we will continue to pour more carbon dioxide and hazardous chemicals into the environment. We apparently do not intend to undertake substantive measures to eliminate ecological overshoot.

Economy vs Environment

Frequent statements are offered that fighting global heating might be acceptable if doing so had no adverse effects upon the economy. However, the environment is humankind's biospheric life support system, which has maintained conditions favorable to our species (and many others) for all of the time humans have been on Earth. If the biospheric life support system is altered so that its functions are drastically changed, *Homo sapiens* will find its society markedly damaged and, in a worst possible case scenario, the species will become extinct. In either case, our precious economy will be badly damaged or even cease to exist. Our economy and environment are inextricably linked, and to pretend they are not is irrational.

Peak Oil

Although coal was important to the Industrial Revolution, the versatile, cheap petroleum provided the most important impetus. However, world oil discoveries peaked at 56 billion barrels per year in 1966, and discoveries are much lower at present. At the same time, the new economic power of China increasingly makes it a major competitor for world oil. The world population is still increasing markedly, so the new oil discoveries will provide even less oil per capita. Actually, much higher gasoline prices will be a blessing because railways, other public transportation, and bicycles, will finally get the attention they deserve. This change is essential because even coal and uranium will become depleted in a few hundred years – much less, of course, if humankind tries to maintain the cheap energy party going at its present rate of consumption. The present response to the energy crisis (i.e., forget conservation – depend upon unproven technologies) is a major reason for concluding that the quest for sustainability should be postponed. The Europeans, now paying over US$7 per gallon for gasoline, must view Americans, who are paying less than US$4 per gallon, with astonishment.

Anthropocentrism vs Ecocentrism

Anthropocentrism is the view that humans are the most important beings on Earth. This view is typical of Judeo/Christian culture, but is now one of the important practices of economic globalization, which is demonstrated by an inclination to evaluate reality exclusively in terms of

human values. Carried to an extreme, anthropocentrism considers that every aspect of the universe is for human benefit. This extreme view is evident in discussions of colonization of other habitable planets to relieve human overpopulation problems.

Ecocentrism recognizes that the ecosphere is the source and support of all life and espouses an ecocentric approach to all human activities. Cairns (2007c) assets that the first step toward ecocentrism is to regard the relationship between humankind and natural systems as coevolutionary. Cairns (2007c) believes that ecocentrism is merely a transitional stage en route to Harden's ecolate perspective, which is humankind's best hope for living sustainably.

Recently (June 2007), US Environmental Protection Agency Administrator Stephen L. Johnson, when commenting on climate change, stated that we do not know if the present climate is optimal for humans. The climate has been suitable for the 160,000 years that *Homo sapiens* has been on the planet and for the approximately 1 million years for the genus *Homo*. Climate changes thus far, extended droughts, floods, increased storm intensity, decreased snow packs on mountain peaks, expanded disease territory, and so on, have not been marked improvements on the previous condition. Since present climate change events have no precedents, predicting the return of comparative climate stability or the state of the new conditions is not possible. Changed and new conditions will not likely be close to the suitable state they were in before the rate of climate change increased. Furthermore, the Director of the US Environmental Protection Agency did not mention other life forms, such as polar bears, that may not survive climate change. This agency should be concerned with protecting the entire environment, using an ecocentric perspective.

However, as Foster (2007) notes, climate change avoidance is often considered good, but only if capitalism can be fully preserved at the same time. Obviously an anthropogenic viewpoint will be counterproductive if we forget that humankind is dependent upon a biospheric life support system and impairs its delivery of ecosystem services.

Thou Shalt Not Transgress the Carrying Capacity

As Hardin (1993, p. 207) notes, the admonition not to exceed carrying capacity is ecology's contribution to ethics since exceeding the carrying capacity in one year diminishes the carrying capacity in subsequent years. The approximately 24% ecological overshoot and the fact that one-half of the world's population is undernourished or starving indicates that Earth's carrying capacity for humans has been vastly exceeded. Heinberg (2005, p. 31, his figure 2) predicts a human population decline from 7 billion in the early 21st century to under 4 billion in 2200, just from the decline in world oil production. Hardin (1993, pp. 212-213) states that an adult human needs about 2,300 calories of energy each day to remain alive and be moderately active. However, in 1993, the energy consumption of the average American was 230,000 calories per day – 100 times as much as the minimum. As cheap energy availability decreases, Earth's carrying capacity for humans will also decrease *if we expect to continue present per capita energy consumption*.

Although exceeding Earth's carrying capacity is a matter of considerable concern, projected population growth in a time of rapid climate change, reduced production of foodstuffs in areas affected by drought, and loss of cheap energy will very likely be disastrous. In 2007, world population is expected to surpass 6.6 billion – a figure not far below Heinberg's 7 billion peak. Moreover, more of the world's population lives in urban areas, far from sources of food, than in rural areas, closer to sources of food. Some predict oil production will peak sometime between 2008 and 2018, after which oil production will begin an irreversible decline, which might well result in a global recession, global food shortages, and resource wars (over both oil and water supplies).

The US Census Bureau predicts world population will reach 7.6 billion people in 2020 and 8.3 billion in 2030. During this period, urban populations will increase substantially. In 2050, the US Census Bureau estimates the world population will reach 9.4 billion people. Contaminated water is expected to be a major issue, as are diseases carried by insects. In 2080, some parts of the planet will become drier, while other parts will experience flood hazards. Coastal populations could increase from 1.2 billion people in 1990 to 5 billion people in 2080. Climate change resulting in sea level rise could produce millions of environmental refugees.

In a period of rapid climate change and loss of cheap, abundant energy, peoples with hunter/gatherer skills should have a marked advantage over urban dwellers. This advantage would be particularly true if global agriculture suffered severe loss of production. If climate change and declining agricultural productivity result in huge numbers of environmental refugees, a hunter/gatherer lifestyle may be the only means of survival for millions of people. However, a predominately urban and suburban population experience in a hunter/gatherer lifestyle has almost ceased to exist. Worse yet, the few remaining hunter/gatherer cultures are often forced out of their traditional territories (e.g., McCrummen 2007). Hardin (1993, p. 201) remarks:

> *Acknowledging the reality of the "greenhouse effect" and modifying human behavior to reduce its consequences will require changes in education and human economy throughout the world. We may fail; if so, we will surely be the first species to have foreseen its own demise.*

Lack of preparation for such catastrophic events may be humankind's biggest mistake.

Transcending Population Taboos

Sustainable use of the planet is simply not possible without keeping Earth's human population within Earth's carrying capacity for humans. In addition, one hopes that the quality of life would be above the subsistence level and that a safety factor would be included in case of disruptions of food and energy supplies. Finally, population increase is a major factor in the 24% ecological overshoot that must be eliminated expeditiously, if only to avoid mass human deaths due to famine. However, powerful taboos keep even minimal discussion of population stabilization from occurring at both national and global levels. The idea of famine from exceeding the carrying capacity for humans in this era of bounty is difficult to accept. However, it has happened; for example, Hagberg (1953, as quoted by Hardin 1993, p. 20) remarks upon biologist Carl Linnaeus' description of a famine in Sweden:

> *I fear that I shall not have any under-gardeners this summer to do daily work, for they say they cannot work without food, and for many days they have not tasted a crust of bread. One or two widows here are said not to have any bread for themselves or their children for 8 days, and are ashamed to beg. Today a wife was sent to the castle (dungeon) for having cut her child's throat, having no food to give it, that it might not pine away in hunger and tears.*

Lest anyone be unaware of present famine deaths, the website http://www.poverty.com reports hunger deaths by the hour – deaths in June 2007 ranged in the high 700's. Some illustrative examples of contributions (for each $100 earned in the respective country) to combat hunger follow: Sweden, 103 cents; United Kingdom, 52 cents; Japan, 25 cents; United States, 17 cents. The World Health Organization (http://library.thinkquest.org/C002291/high/present/stats.htm) estimates that one-third of the world is well-fed, one-third is underfed, and one-third is starving. The Indian subcontinent has nearly half the world's hungry people. Africa and the rest of Asia together have approximately 40% of the world's hungry, and the remaining hungry people are found in Latin America and other parts of the world. Surely, this situation deserves a free and open discussion on population as the world faces rapid climate change and the end of cheap, abundant energy.

Since the Malthus era, technology (especially that based on cheap fuel) has increased the carrying capacity of Earth for *Homo sapiens*. However, the onset of peak oil, combined with rapid climate change, will reverse this trend, while the population is still growing markedly. This situation will result in one of only two basic outcomes: (1) social evolution to keep the population within Earth's carrying capacity or (2) do nothing and let nature take its course and reduce human population size within Earth's carrying capacity. For all other species, nature "solves"

overpopulation with disease and famine (e.g., Klein 1968). However, Earth's carrying capacity has a dimension that makes the optimal number difficult to state. Hardin (1993, p. 213) states it concisely: ". . . the quality of life and quantity of it are inversely related."

However, quality of life rarely enters discussions on overpopulation. In the 1600's, people accepted financial restraint on marriage. For example, the Elizabethan Poor Law of 1601 was summarized in 1651 as: "(T)hey who could not maintain a wife, might not marry, for a License they could not have . . . usually none were permitted marriage until they were thirty five at least, and the woman thirty" (Hardin 1993, p. 221). Historians state that, years ago, at the Pocahontas coal mine in West Virginia, if a miner were killed, then his widow had to marry quickly or be evicted from company owned housing. At present, western societies no longer have decrees that espouse reproductive prudence since the right to reproduce is a strong component of individual rights. This individual right is possible only in societies that can afford a safety net, which theoretically protects the young from reckless reproduction. The African HIV/AIDS pandemic does not have an effective safety net, although some aid is provided by developed countries. However, in the near future, the combination of global heating and the loss of cheap energy may result in a return to the thinking of an earlier era when the family was entirely responsible for the survival of its progeny. This return need not be the case, but, if not, reasoned discussions must occur of society's responsibility in an age of rapid climate change and diminished resource availability (e.g., Howden 2007).

Finally, should this discussion be based on an anthropogenic or ecocentric viewpoint? Exceeding Earth's carrying capacity will damage the biospheric life support system and, thus, threaten human survival. Other developed countries should be better prepared for this than the United States since their administrations have accepted the scientific evidence for global heating. However, the worst case scenario will be horrific unless global remedial measures to reduce greenhouse gas emissions sharply are taken immediately – the prospects for this development are not good.

Conclusions

Arguably, the disinformation campaign attempting to undermine overwhelming scientific evidence on global heating is the greatest hoax ever carried out on humankind. The robust science of the Intergovernmental Panel on Climate Change has been primarily responsible for diminishing, but not eliminating, the disinformation campaign of the anti-global heating lobbyists, and former US Vice-President Gore's "An Inconvenient Truth" documentary has had a major impact on public opinion in the United States.

The reports of Intergovernmental Panel on Climate Change have brought reason and science back into the global heating debate, but humankind will pay dearly for the decades-long inaction on greenhouse gas emissions caused by the disinformation campaign. At present, the debate has shifted from science (although science will remain important) to ethical/moral issues. Can humankind disenthrall itself from the illusion that the cheap energy party will continue and pay attention to the warnings science has been providing for decades on global heating? Does humankind have the ethical/moral convictions to do what needs to be done? We already know what we must do (e.g., reduce greenhouse gas emissions, use energy efficiently, and use less energy per capita) and have the means to do it. Above all, we must resist the temptation to engage in resource wars to solve the present crisis. Preemptive nuclear wars must become unthinkable. A nuclear war, with as few as a dozen Hiroshima-level bombs, would probably result in a nuclear winter, which is definitely not the way to resolve global heating problems. All the nations that possess nuclear weapons need a well informed citizenry that is capable of acting with both hearts (ethics/morals) and minds. Since illustrative ethical/moral questions follow.

(1) Since the large greenhouse gas emitting nations are having serious, adverse effects upon low greenhouse gas emitting nations, should they voluntarily reduce emissions to protect the affected nations?

(2) Since the gap in global resources is vast between the poor and wealthy, and is still increasing, how should this issue be addressed?

(3) Overpopulation is already a major resource problem. In short, humankind has markedly exceeded Earth's carrying capacity. Global heating and increased scarcity of petroleum (important to production of foodstuffs) will almost certainly reduce Earth's carrying capacity. How should this problem be addressed?
(4) Arguably, only few, if any, places exist on Earth that are unaffected by human activities. Humans use a vast disproportion of the planet's space and resources. How much space and resources should be set aside for the 30+ million other life forms with which humans share the planet? Collectively, these other life forms constitute Earth's biospheric life support system, which makes human survival possible.
(5) What is humankind's obligation to and responsibility for the 1 billion environmental refugees expected in the first half of the 21st century (Lyon 2007)? Even with a plan, chaos and anarchy might result, especially if there are no sound plans for housing (including sanitation and water supplies) and feeding them. If medical services are inadequate, a refugee camp might well be the epicenter for a pandemic disease. The refugee problem already exists –the scale and rapidity of change may catch global society unprepared.
(6) A number of proposals have been offered for decreasing atmospheric carbon dioxide by placing iron in the oceans to stimulate algal growth (thereby removing some atmospheric carbon dioxide). In at least one case, the announced purpose of the project is to make a profit selling carbon offsets. Many uncertainties are tied to attempts to use algal blooms to remove atmospheric carbon dioxide. If the bloom is followed by a massive algal die off, will the decomposing biomass release carbon dioxide into the atmosphere and/or increase oceanic acidification? Sergo (2007) give persuasive reasons why the carbon dioxide may not remain in the ocean. Should the profit-making group be required to post a bond to compensate for an "unexpected" ecological disaster? What organization or nation has the authority to issue a permit for the experiment and exact penalties if there is damage to human health and/or the environment? What remedial measures will be undertaken if harm results from the experiment? These illustrative questions should be addressed before any experiment is authorized.

As a scientist, I am enthralled to witness a part of the greatest global experiment in human history. Scientists have continued their investigations, undaunted by the persistent, well funded disinformation campaign. In the United States, persistent efforts have been made to silence prominent scientists, such as government scientist James Hansen; not only have these efforts failed but they have actually brought increased attention to Hansen's research.

As a father and grandfather, I am apprehensive about the world my children and grandchildren will inhabit. However, they are active, intelligent, and creative and will make the best of whatever environment they encounter. Perhaps humankind needed a challenge of this magnitude to counter the fixation on economic growth.

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