

Reexamining "The Inherent Worth and Dignity of Every Person" Paradigm in an Interdependent Web of Life Context

Human beings have evolved a plurality of ways of engaging spirit, nature, and one another so as to enable their mutual flourishing; we need to be critically faithful to each of these ways, separately, and in interplay with each other, if we are to set our species on a just, sustainable, and spiritually fulfilling path of planetary evolution. This is the promise of the marriage of the ecological world view and the democratic ideal in our epoch.

Engel, 2000

What use is a house if you haven't got a tolerable planet to put it on?
Henry David Thoreau

Individual Connection to the Biosphere: The Noosphere Concept

The word "noosphere" is composed of two Greek terms, "noos" or mind and "sphere" used in the sense of biosphere – the living envelope of Earth. The noosphere concept refers to an evolutionary stage in which humans become aware of their capacity to influence the course of biospheric evolution (personal communication from Vladimir Zolotarev, author, NooDigest noo@ibiw.yaroslavl.su) LeRoy (1928, as quoted in Stokes, 1992) examined the reasons and practices of humankind's formidable power over the physical, and thus ecological, environment. He reflected on the power of the human intellect to transform the biosphere into the sphere of reason – the noosphere. Le Roy stressed that a profound philosophical analysis of *human activities* (italics mine) and, above all, of the role of reason on Earth is required. The great Russian philosopher V. I. Vernadsky expressed faith in the life of reason and was impressed by LeRoy's concept of the noosphere (personal communication from Vladimir Zolotarev). Vernadsky's materialistic concept of the noosphere refers to the part of space that experiences the influences originating in man's mind. Vernadsky writes "The development of the biosphere into noosphere is a natural phenomenon, more profound and powerful in essence than human history."

The concept of the noosphere was further expanded by LeRoy's colleague, Catholic theologian and paleontologist Pierre Teilhard de Chardin, in *The Phenomenon of Man*. Teilhard de Chardin's (1965, p. 31) concept of the noosphere is definitely spiritual: "The task of the world consists not in engendering in itself some supreme reality but in bringing itself to fulfillment through union with a preexistent Being."

In the United States, where economic growth, material possessions, and individualism are lauded by so many, a harmonious mind/biosphere relationship seems an "impossible dream." Yet, the cultural creatives described by Ray and Anderson (2000) care deeply about ecology and saving the planet, spirituality, relationships, and peace. They believe that a creative minority has the enormous leverage essential to cause a paradigm shift. They envision a new, saner, and wiser culture. Further, they believe that cultural creatives are the "invisible" third culture in a society perceived as consisting of only two cultures – moderns and traditionalists. The primary weakness in this postulate is that it fails to examine how each culture would respond to major catastrophes that might plausibly occur, given present exponential rates of human population increase and environmental change. A gradual transition may well favor the cultural creatives, but major global catastrophes may well favor the traditionalists or updated modern (technology,

competitiveness, etc.) paradigm. Continued exponential growth could easily result in societal disequilibrium globally and different paradigms in different cultures at different times. Since there is now an unprecedented globally interactive system, these changes will have a major influence on the dominant paradigm in the United States.

Top-down/Bottom-up Ecology

The field of ecology has two compatible but different approaches. The "bottom-up" approach begins with a study of the components of a system (the interdependent web of life) or species with the assumption that some knowledge of component dynamics is essential to an understanding of the system. The "top-down" approach assumes that, without an understanding of the system in which the components are embedded, neither the component nor the system will be properly assessed. Actually, the high probability is that the components and the system are co-evolving, although a scientific test of this hypothesis is unlikely to be persuasive in time frames of interest to human society. However, Boff's (1995, p. 11) *ecologico-social democracy*, which accepts not only human beings as its components but every part of nature as citizens, might be regarded as a co-evolution of two interacting systems, each strongly influenced by the other. Daly and Cobb's (1989) book on redirecting the economy toward a common good might also be interpreted this way. Cairns (1994) notes that co-evolution between human society and natural systems can be either hostile or benign. If the former, human society may end up sharing the planet with species it cannot control – i.e., pests. A benign relationship would benefit both partners – i.e., human health is closely linked to ecosystem health.

Parton (1999) believes that the preservation of nature, by itself, will not become a mass movement, even though human survival depends on it, unless accompanied by a genuine sense of community and friendship within human society itself. Parton (1999) believes that mass appeal might be achieved by offering people the opportunity to belong to a genuine community in service to Earth. I agree "wooing" nature requires peace (Cairns, 2000) and peace requires friendship!

Convictions about Science and Its Social Role

Segerstråle (2000) documents in considerable detail such themes as the objectivity of science, the social use of scientific knowledge, human nature, political bias, and personality clashes using the sociobiology debate as a unifying theme. She notes that not only cognitive differences but also strategic interests come into play on both sides. She remarks that one could describe the situation between the two primary opponents (Lewontin and Wilson) in the sociobiology controversy as one of symbiosis. Segerstråle comments that it was in both parties' "interest to keep the controversy going, not to clear up misunderstandings, and not to examine too closely where the real differences lay but rather to retain the attention of the scientific community." Segerstråle (p. 50) describes the situation as an opposition between a purist, critical, logical approach with slightly negative overtones (Lewontin) and a practically oriented, opportunistic, speculative, and generally "positive" model-building approach, where judgement is postponed until later (Wilson). All of these elements and more enter into the debate about the individual worth and dignity of every person. Some use the "bottom up" approach using the individual as the basic unit (as some humanists do) and others use the "top down" approach using the interdependent web of life as the basic unit (as I do) and examine individual worth and dignity in that context. Both approaches have merit but generally lead to quite different

conclusions.

Inherent Worth and Dignity

If humans acknowledge a dependence on the biospheric life support system (the interdependent web of life) or, at a minimum, a respect for the interdependent web of life, it seems reasonable to judge the inherent worth of an individual in the context of the individual's relationship with the interdependent web of life. Stated more brutally, is it a destructive or constructive relationship? If the relationship is destructive, it is difficult to visualize how any rational person could describe individual worth except as a potential rather than an actuality. As a caveat, it is wise to withhold judgment on destructive behavior until there is some evidence in the form of precedent, practices, or actions that support the decision being made. However, the tolerant approach carried too far will place natural systems at increased risk if a natural system ethic is rare. If the relationship with the interdependent web is constructive, leading to protection and accumulation of natural capital rather than its destruction, and there is evidence to support this judgment, the affirmation has substance. In the absence of this evidence, it is a platitudinous statement lacking any substantive ethical or moral value. Further, it is a disservice to both society and natural systems if it is used as a ritual substitute for effective action.

Humanity's Habitat

An individual in an inadequate or unsuitable habitat can sometimes achieve a semblance of dignity; however, one of the sources of dignity is the way in which an individual behaves in a particular setting. Most individuals require good conditions to achieve a significant portion of their potential. In addition, it is virtually impossible for a literate person to be unaware of the inadequate resources available to a large number of the world's humans. For example, Cassidy (2000) reports a World Bank statistic that almost half the 6 billion people on the planet live on less than US\$2/day and more than 1 billion on less than US\$1/day. By comparison, many sweatshop workers who produce apparel for American college students are comparatively well off.

In 1999, the global population of humans exceeded 6 billion. In only 12 years at the end of the century, 1 billion were added, the number of humans in India's population at the end of the century. During the last half of the 20th century, world population increased from 2.5 billion to 6 billion (Brown, 2000). Anyone interested in product quality control might reasonably ask: if human production rates are this rapid with such large numbers, how does one ensure acceptable quality of life that will enable the potential worth and dignity to be adequately expressed for a substantial majority of humans – certainly not by further damaging natural capital. Sharing and a less materialistic life among the affluent seems to be the most attractive solution.

Declining Per Capita Resources

Individual fitness (ability to achieve inherent worth) requires a continual expenditure of resources. In this regard, it is noteworthy that world grain production per capita dropped by more than 2% in 1999, extending a decline that has been underway since 1984 – one that has reduced per capita grain production worldwide by approximately 10% (Brown, 2000). These sobering figures do not tell the entire story. A small but growing share of the world's grain harvest is being produced through unsustainable use of land and water (Brown, 2000). Postel (1999) describes in considerable detail some of these practices involving irrigation of agricultural

land. The *State of the World* published each year by World Watch, numerous United Nations reports, and the many publications of others have documented that resources are not infinite on a finite planet and that the problems of unsustainable practices will continue until human society faces them squarely.

Maldistribution of Resources

For those interested in increasing their literacy in the area of maldistribution of resources, an excellent book by Wackernagel and Rees (1996) illustrates the vastly different per capita impact ("ecological footprint") on the interdependent web of life (e.g., the biospheric life support system). Ecological footprint size can be determined by estimating the annual consumption of particular items from aggregate regional or national data and then dividing the total consumption by population size. This calculation is much simpler than attempting to estimate individual or household consumption by direct measurement, but this measurement can be taken as well. The next step in the calculation is to estimate the land area appropriated per capita for the production of each major consumption item. Wackernagel and Rees divide their areas of consumption into five major categories: (1) food, (2) housing, (3) transportation, (4) consumer goods, and (5) services. Energy is difficult to determine in this calculation because the fossil fuels currently available have been obtained from what Catton (1980) refers to as "phantom land" – the ecosystems that produced the fossil fuels are long gone, but society is still using their productivity today. Another way to determine the "energy land" component of the ecological footprint calculation is to estimate the area that would be required to grow fuel crops to replace the depleting stocks of fossil energy. This determination may be a superior method when considering sustainable use of the planet.

Wackernagel and Rees (1996) give comparisons of ecological footprints in hectares per person: Canada: 4.3, USA: 5.1, India: 0.4, the planet as a whole: 1.8. The *Netherlands fallacy* is the term commonly used when proponents of unlimited growth mention the population density of the Netherlands and the quality of inhabitant life. Blithely ignored is the fact that the per capita ecological footprint in the Netherlands is 3.32 hectares per capita, which clearly shows that the people in the Netherlands require more land than they actually occupy to maintain their quality of life, even though their ecological footprint per capita is dramatically smaller than that of an individual in the United States. I have worked with ecological numbers and figures for my entire professional career and find the calculations of Wackernagel and Rees (1996) very persuasive. Nevertheless, I have been mesmerized by Menzel's (1994) photographs in *Material World: A Global Family Portrait*, which shows representative families from a number of different societies posing before their dwellings surrounded by all of their possessions. Details accompany each family group photograph, such as the size of the family, income, and the like. Statistics for each country, such as the area, population size, population density, ethnic composition, literacy rate, infant mortality, life expectancy, and rank of affluence among United Nations members, are also given. However, the pictures are haunting. Regrettably, all too many of the wishes for the future of the participants being photographed involve material possessions.

Since the United States is clearly the world's leading automobile culture, it is instructive to examine the private car use per capita versus population density.

	Persons per acre	Miles driven per person
United States	36.3	6740
Canada	64.4	4307

Europe	123.3	2802
Developing Asia	402.1	999

Another instructive set of numbers is commercial energy per capita by gigajoules (one gigajoule equals 0.36 barrels of oil); these are 1995 figures (world average is 61).

	Commercial energy consumption per capita, in gigajoules (1995 figures)
Africa	13
Asia	31
South America	38
Central America	137
Europe	145
Pacific Islands	173
North America	317

If one expresses a belief in the inherent worth and dignity of every person, then, in view of these numbers, just how is it being expressed in today's society? As a worst possible case scenario, the assertion of a belief in inherent worth and dignity is a substitute for more active implementation of social concerns. Is it a denial of personal and institutional responsibility? Donella Meadows has calculated that to provide the American per capita level of material goods and resources to all of Earth's present population would require at least three planets comparable to Earth. At the present population growth rate of 1.7% annually, the doubling time of the current population is 41 years. Thus, without any increase in material goods per capita, another Earth will be needed in 41 years if the population continues to expand at its present rate. The only rational way to achieve equity and fairness in material resource distribution among humans is for the profligate users to reduce consumption to permit a more equitable distribution of finite resources. This change would still leave unaddressed the problem of equity and fairness in resource use with the millions of other species on the planet.

Resources and the Interdependent Web of Life

The classic paper of Vitousek *et al.* (1996) provides persuasive evidence that one species (*Homo sapiens*) of the estimated 30 million or more on planet Earth is co-opting approximately 30% of the sun's energy, which is converted by living material through photosynthesis to provide food and other resources used by all species. Decades ago, world-class ecologist Aldo Leopold remarked that "to be an ecologist is to live in a world of wounds." What he was noting then is still true today – the average, educated person has a low ecological literacy and is virtually certain to be strongly influenced by the barrage of propaganda designed to minimize the seriousness of environmental problems. In a society essentially oblivious to the ecological wounds, it is arguably a curse to be able to see them and recognize the inability to have any significant impact on the destruction of the web of life or its restoration when damaged. This situation is frustrating, and, although not admirable, many have chosen silence rather than endure a platitudinous response to serious inquiries. The same environmental slogans, essentially unchanged, have been used for over half a century. During this time, the situation has

appreciably worsened. Two notable exceptions exist to this silence: responding to requests for help in situations where the established dogma is clearly not working, and writing for professional journals where the level of shared knowledge is substantial.

Multidimensional Wounds

The world's wounds are not only ecological. Any area of conflict – racial, economic, religious, ethnic, and even demographic – will cause wounds that the enlightened can see and the unenlightened cannot. To be fully aware of them all is emotionally shattering, and to even be fully aware of one category usually exceeds the tolerance of most people. Going beyond the platitudes is disquieting and virtually guarantees that one will be labeled a pessimist. However, a free and responsible search for the truth will inevitably disclose some unpalatable facts. The goal of a world community, including other species in the interdependent web of life, with peace, liberty, and justice for all, requires both acute awareness of inequities and significant efforts to diminish them.

Passive caring is arguably an oxymoron. Active caring, without an adequate level of literacy, may be more dangerous than apathy. These statements are offensive in a "feel-good" society, but I find a compassionate society infinitely more attractive! However, compassion, to be meaningful, requires empathy which, in turn, usually mandates significant changes in behavior.

Consilience

Wilson (1998) resurrects the word *consilience* (literally, a leaping together) to describe recombining the fragmented and diverse areas of knowledge in a holistic manner to meet the emerging challenges of the time. Some important interfaces in this web of knowledge that are important to this discussion follow:

1. the degree of linkage between human and environmental health.
2. the degree to which exercise of individual "rights" damages the integrity of the interdependent web of life.
3. the relationship between economic growth and the preservation and accumulation of natural capital.
4. the degree to which the concept of sustainable use of the planet is essential to the well being of all humans, including future generations.
5. the determination of the balance between developing the potential of each human (the human condition) and maintaining the condition of the interdependent web of life, which is composed of the human and millions of other species (the ecological condition).
6. the determination of the degree to which disparity of resource allocation, within the human species and between humans and the millions of other species, affects the prospects for sustainable use of the planet.
7. the determination of the degree of diversity that facilitates the cooperation essential to achieving a sustainable world for all species.

Designing a Life in Harmony with Nature

Human society's dependence upon the biospheric life support system (the living "skin" of the planet) is becoming rapidly more apparent in science, but society, as yet, does not cherish nature. Millions of other species vigorously seek space and resources just as *Homo sapiens* does.

Human ancestors were comparatively small in numbers and had primitive technologies. For them, the world must have appeared either hostile (e.g., large predators) or at least reluctant to share food and shelter. No species willingly gives up resources without getting something in return (e.g., nectar attracts pollinators). To achieve even a modest improvement in living conditions, it was essential for early humans to subdue nature. Even in the last few centuries, animal and planet resources seemed unlimited in such places as Africa and North America. However, exponential growth of the human population and a concomitant exponential growth in per capita affluence in much of the population destroyed the balance that existed when humans were hunter/gatherers. Now, regional planners decide the degree to which nature can be tolerated without impairing economic growth. All too often, a token amount, which is not really a natural system in the eyes of a trained observer, is set aside with great difficulty. Communities may wage heated debates over whether land should be left as a nature preserve where other species can be respectfully observed or whether it should be used for recreation, etc. with a "natural" peripheral area around the human artifacts (Browder *et al.*, 2000).

Nature's Trump Card

In this technological world with a global economy, it is easy to forget that natural systems are also the ecological life support system. Natural systems provide services, such as maintaining the atmospheric gas balance, for which there is no technological substitute (e.g., Hawken *et al.*, 1999). The survival of human society, as it is at present, depends upon a healthy ecological life support system. Two choices are available: react before more damage occurs or react after the damage is so severe that all but the most intractable skeptics acknowledge it exists. The latter choice seems most probable since, when a major ecological threshold has been crossed, disequilibrium is quite common. However, it is prudent to advocate precautionary, preventative action for however long the option remains of reacting before damage occurs.

How Much Environmental Damage Is Tolerable?

Every individual in a technological society creates some environmental damage. Even hunter/gatherers appear to have driven some species to extinction. Comparatively low technological societies, such as the Polynesians, that colonized islands previously uninhabited by humans clearly drove many species to extinction (e.g., flightless birds). However, both the amplitude of the impact and the rate of change in the 20th century was unprecedented in human history (e. g., McNeill, 2000), and robust evidence indicates that present societal practices are unsustainable (e. g., Ehrlich, 1997). The concepts of natural capitalism (e. g., Hawken *et al.*, 1999) and the natural step (e. g., Natrass and Altomare, 1999) are similar alternatives to the present, unsustainable, infinite growth paradigm. Alternative paradigms exist for transportation (e. g., National Research Council, 1997) and company management (e. g., Anderson, 1998). Even with these alternatives, the increased risk of severe damage to the ecological life support system seems the likely choice over a change in personal and societal behavior.

Inherent Worth and Dignity of Each Individual During and After the End of Material Affluence

Nature has numerous ways of controlling numbers of individuals of a population of any species that exceeds the carrying capacity of its resource base. The most common controlling measures for animals are famine and disease. For humans, war can be added. At least half the

planet's human population is living under conditions the other half would consider unacceptable. The ecological life support system is global and protecting its integrity requires an ethos (a set of guiding values) commonly shared. The demand for increased automotive mobility has both fragmented and destroyed natural systems, and highway construction still continues. To support increasing populations and per capita affluence, notable alterations have been made to protective vegetation, which has increased erosion and exacerbated flooding. The growth of towns and cities has also degraded natural systems. Just living as humans now do damages the planet's ecological life support system, but it also affects the resources available for others, the quality of life of future generations, and the survival of other species and the integrity of the planet's ecological life support system. Without adequate resources, the probability of any human, present or future, realizing a portion of the inherent potential and achieving some degree of dignity is small.

However, protecting the ecological life support system requires either voluntary individual restraint in use of resources on a large scale or some form of mutually agreed upon governmental coercion. Neither seems likely at present, at least in those societies with the larger per capita ecological footprints. However, present practices (e. g., favoring exponential growth on a finite planet) are almost certainly unsustainable and, thus, likely to produce environmental, economic, and political surprises. Two simultaneous surprises could interact synergistically and make the effects more devastating than simply adding the two together. Individual inherent worth and dignity are not likely to remain at present levels under these circumstances. The potential may well remain unchanged, but manifestation of worth and dignity probably will not.

The Planetary Human Feed Lot

In the United States, some domesticated mammals, such as cattle and pigs, are kept in high density in enclosures called "feed lots." Food and water are supplied and sometimes minimal shelter. Their environment or habitat differs dramatically from the habitat of their undomesticated counterparts. Wild pigs, particularly, presently inhabit an astonishingly diverse range of habitats and are exceedingly resistant to attempts of humans to eradicate them in areas where they are considered pests. Unlike many other organisms, they are not driven to extinction by a predator with a remarkable technological prowess. Surely, a charitable observer would credit wild pigs with more inherent worth and dignity than their domesticated counterparts in feed lots.

Why then are humans doing the same thing to their own species? Overpopulation due to the tyranny of a multitude of individually insignificant "small decisions" has resulted in ever increasing numbers of humans living in cities – some no more than marginally better for many individuals than the conditions in animal feed lots. Shelter may be better, but inoculation against disease is worse. The quality and quantity of food and water is less dependable, and starvation is more common than in feed lots.

Surely, the realization of inherent potential worth and dignity is a function of habitat and resource quality and quantity for all species. If so, then the inherent worth and dignity of humans should be discussed in a biospheric context so that there is transgenerational equity for the human species and equity and fairness for other species that collectively constitute the planet's ecological life support system.

Are Humans the Measure of All Things?

The first picture of Earth taken from outer space caused many people to feel insignificant. Yet, this idea was not new knowledge. Being part of a universe consisting of an estimated 50 billion galaxies is certainly ego-inflating, but, after all, it was human science and technology that enabled humans to have this new perspective. The more recent Hubble telescope, which recorded stars that were one billionth the intensity that humans can see with the naked eye, did not change the universe, but rather the temporal and spatial scales of the perspective. In many fields, such as astronomy and ecology, such information is increasing exponentially. This knowledge should increase awe and wonder, but should not deflate egos unless it appears to undermine human values and practices. Science documents the attributes of the natural world and attempts to achieve some degree of consilience with the multidimensional evidence generated. In the realm of human values and practices, i.e., religion and ethics, science may both illuminate and validate. However, scientific evidence may also indicate that it would benefit from modification and occasionally a major paradigm shift. Sustainability requires self-discipline, and self-discipline is well worth cultivating as the tyranny of small decisions demonstrates.

The Tyranny and Serendipity of Aggregate, Small Decisions

Economist Kahn (1966) and ecologist Odum (1982) have persuasively argued that seemingly insignificant, small decisions can both tyrannize lives and damage the environment if large numbers of people make similar, small decisions. Anyone who has been caught in a traffic jam understands this concept. However, aggregate decisions need not tyrannize. Aggregate, individual, small decisions can also benefit both human society and the environment (Cairns, in press), e.g., individuals donating to charities and using less fossil fuel. There is a major difference between the two situations. If the aggregate, individual, small decisions damage the integrity of the interdependent web of life (the ecological life support system), individual human worth and dignity will become a meaningless abstraction. If, on the other hand, the aggregate, individual, small decisions improve the integrity of the planet's ecological life support system, individual potential for both the human and other species is more likely to be realized.

If one acknowledges human society's dependence upon the ecological life support system and/or an ethical obligation to preserve its integrity, then one must accept the concomitant responsibility of judging the worth and dignity of each individual in the system context of the interdependent web of life. Society cannot ignore crimes against the biosphere by hiding behind an assertion of respect for the "worth and dignity" of each individual. Nor can society tolerate aggregate acts that damage the interdependent web of life by defending the rights and freedom of the individual. Nature exacts severe penalties upon societies that severely damage the ecological life support system (e.g., Diamond, 1994, 1997).

Small decisions are in a sense "invisible" because, in isolation from other similar, small decisions, they seem unimportant. However, unless each individual can "see" his/her personal contributions to the cumulative impact, society cannot achieve the "impossible dream" of sustainable use of the planet.

Anyone living in urban or suburban areas is so accustomed to having their lives tyrannized by aggregate, small, seemingly unimportant decisions that they rarely analyze them carefully. For example, traffic jams or slowdowns are solved by attempting to build more roads or enlarge existing roads rather than considering how these decisions increase human artifacts.

At the end of the year 2000 and the beginning of 2001, California furnished an excellent example of this tyranny. Unusually cold weather, the holiday season, and escalating energy prices infuriated people who were accustomed to cheap energy on demand. Individual decisions to use appreciably less energy and to use energy more efficiently during an energy crisis, if sufficiently widespread, might well eliminate the "crisis" or, at the very least, lessen the possibility of brownouts and other inconveniences. For the poor, any significant increase in energy prices almost certainly affects the quality of their lives and their personal comfort.

The tyranny of small decisions affects species other than just humans, often leading to their extinction. The Associated Press (2000a) reports that the 2000 Red List of Threatened Species is the most comprehensive analysis of global conservation ever undertaken; even so, many species remain unidentified and many of these may become extinct before they are even given taxonomic names. As the Associated Press (2000b) notes, even though Rwanda is home to about half of the world's 620 remaining mountain gorillas, Rwandans say that people come first and gorillas second. Demographic pressures resulting from millions of individual decisions will most likely cause the mountain gorilla's extinction in that country, probably without appreciably helping humans in the long run if their present behavior persists. One can sympathize with the people in an impoverished country wishing for a more proportionate share of the world's resources, but living sustainably is both a global and a regional problem. In the United States, Knight Ridder/Tribune (2000) reports that cell-phone road rules are not likely despite the fact that they appear to be a greater highway hazard than the unsafe tires that have recently received so much publicity. The article notes that some research implicates cell-phones in 450 highway deaths a year or more and the number of lesser accidents is considerably higher. Although not stated explicitly, a number of human deaths, injuries, and property damage is more acceptable than limiting individual freedom to use a cell phone under any circumstances while driving. If humans are reluctant to modify their behavior to protect other individuals of their own species, it seems unlikely that they will do so for other species.

Romo (2000) notes that the population of the border region with Mexico is projected to grow about 40% in the next two decades under a low estimate and more than double under the highest estimate. Ciudad Juárez, Mexico, with a population of about 1.4 million, relies entirely on ground water from the Hueco Bolson aquifer. However, hydrological studies have estimated the city's wells could begin running out of fresh water in 5 years. This is another representative example of the tyranny of aggregate, seemingly insignificant small decisions. Regrettably, water resource misuse (as well as the misuse of other natural resources) is exacerbated by government subsidies. Fortunately, there are solutions to water resource problems, even in water-scarce areas (e.g., Committee on Sustainable Water Supplies for the Middle East, 1999). Naturally, these solutions require substantive changes in both individual and societal behavior since the quantity of water on the planet is finite and the percentage represented by fresh water exceedingly small.

Water quantity is only part of the problem, the other being water quality. For example, Soussan (2000) notes that samples taken from the San Juan River and Rio Grande waste water show traces of painkillers and estrogen. Other drug residues have been reported as well. Arguably, the more unsettling documentation of contaminants in water has been furnished by Colborn and Clement (1992). Although particular industries are the source of many of these contaminants that disrupt human endocrine systems, they are being produced because of a number of individual decisions to use particular products.

In the absence of a societal ethos (e.g., Cairns, 2001) or set of guiding values mutually

agreed upon, government coercion (i.e., legislation) seems to be the only way to avoid the tyranny of aggregate, small, individual decisions. Although this is unpalatable to anyone who values individual freedom, it is the planet's ecological life support system as well as human health that is being endangered. If societal literacy and ethics are not sufficiently robust to develop an ethos in time, undoubtedly laws and regulations will proliferate, as happened in World War II when resource use by individuals was severely restricted when the nation's survival was threatened.

The Ultimate Test of Human Intelligence

Human intelligence, which is responsible for both creativity and ingenuity, has had survival value for most of *Homo sapiens* existence on the planet. Evidence is persuasive that intelligence, coupled with compassion, literacy, and reason, has been enormously beneficial to individuals, the individual kin of the individuals, tribal units, and even sizable societies on occasion. On the other hand, intelligence during such events as World War II has been used to develop technologies enormously destructive to both humans and the environment.

If the planet's ecological life support system on which humans are dependent is severely damaged or placed in severe disequilibrium, which results in changes unfavorable to *Homo sapiens*, then intelligence will have failed the ultimate test of ensuring the survival of the human species. Sustainable use of the planet and natural capitalism both require the preservation and protection of natural capital (i.e., the ecological life support system and the services it delivers). Unless this preservation is accomplished, the concept of inherent worth and dignity of every person will have little or no meaning. Certainly it would have no meaning if the human species does not survive – an unpleasant but possible scenario if it continues to destroy its ecological life support system. Even if vital resources, such as quality water supply, are severely reduced in per capita terms, many inherent human qualities are unlikely to be fully expressed.

So the ultimate test of human intelligence is the ability to develop a harmonious relationship between each human and the interdependent web of life. Failure to see human society as a part of nature, rather than increasingly viewing humans as apart from nature, is surely failure to use intelligence as a long-term survival mechanism. Individual rights of humans are much discussed these days, but acknowledgment of a dependence on the interdependent web of life or a responsibility for maintaining its integrity is not. For some people, this is undoubtedly due to low ecological/environmental literacy (an uncharitable person might use the word *ignorance*) or, in some cases, it may be due to denial of the information despite substantial exposure to the evidence.

Although science can use evidence to develop probabilistic determinations of risks, etc., the value judgments must be based on ethical, moral, and religious considerations. It is important that religions explore in a much more substantive way the relationship between the inherent worth and dignity of every person in the context of the planet's life support system (the interdependent web of life of which humans are a part).

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Literature cited

- Anderson, R. C. 1998. *Mid-Course Correction: Toward a Sustainable Enterprise: The Interface Model*. Chelsea Green Publishing Co., White River Junction, VT. 204 pp.
- Associated Press. 2000a. Cries of extinction are fast becoming reality, study says. *The Roanoke Times* Sept29:A1-2.
- Associated Press. 2000b. People 1st, gorillas 2nd, Rwandans say. *The Roanoke Times* Nov19:A22.
- Boff, L. 1995. *Ecology and Liberation: A New Paradigm*. Orbis Books, New York.
- Browder, J., J. Cairns, Jr., J. Grady, O. Miller, K. Robinson-Beers, and L. Skabelund. 2000. Brown farm decisions call for visionary leadership. *The Roanoke Times* Oct29:NRV 2.
- Brown, L. R. 2000. Overview. Pages 17-29 in *Vital Signs*. W.W. Norton & Co., New York.
- Cairns, J., Jr. 1994. Ecological restoration: Re-examining human society's relationship with natural systems. The Abel Wolman Distinguished Lecture. National Academy of Sciences, Washington, DC. 20 pp.
- Cairns, J., Jr. 2000. World peace and global sustainability. *International Journal of Sustainable Development and World Ecology* 7:1-11.
- Cairns, J., Jr. 2001. Commentary: Equity, fairness and the development of a sustainability ethos. *Ethics in Science and Environmental Politics*
<http://www.esep.de/articles/esep/2001/editorial1.pdf>
- Cairns, J., Jr. In press. Repairing the country's ecological infrastructure: The cumulative impact of small decisions. In *Atlantic White Cedar Management and Restoration Ecology Symposium*, R. B. Atkinson, D. A. Brown, and R. T. Belcher, ed. Christopher Newport University, Newport News, VA.
- Cassidy, J. 2000. Comment: They are the world. *The New Yorker* Oct9:29-30.
- Catton, W. R., Jr. 1980. *Overshoot: The Ecological Basis of Revolutionary Change*. University of Illinois Press, Urbana, IL.
- Colborn, T. and C. Clement. 1992. *Chemically-Induced Alterations in Sexual Functional Development: The Wildlife-Human Connection*. Princeton Scientific Publishing Co., Inc., Princeton, NJ. 403 pp.
- Committee on Sustainable Water Supplies for the Middle East. 1999. *Water for the Future: The West Bank and Gaza Strip, Israel, and Jordan*. National Academy Press, Washington, DC. 226 pp.
- Daly, H. E. and J. B. Cobb, Jr. 1989. *For the Common Good: Redirecting the Economy toward Community, the Environment, and a Sustainable Future*. Beacon Press, Boston, MA. 500 pp.
- Diamond, J. 1994. Ecological collapses of ancient civilizations: The golden age that never was. *Bulletin of the American Academy of Arts and Sciences* 47:37-59.
- Diamond, J. 1997. Paradieses lost. *Discover* 18:68-78.
- Ehrlich, P. R. 1997. *A World of Wounds: Ecologists and the Human Dilemma*. Ecology Institute, Oldendorf/Luhe, Germany. 210 pp.
- Hawken, P., A. Lovins, and H. Lovins. 1999. *Natural Capitalism*. Little, Brown and Company, New York. 378 pp.
- Kahn, A. E. 1966. The tyranny of small decisions: Market failures, imperfections, and the limits of economics. *Kyklos* 19:23-47.
- Knight Ridder/Tribune. 2000. Cell-phone road rules not likely. *The Roanoke Times* Dec21:A1,A4.

- LeRoy, E. 1928. *Origins of the Human Race and Evolution of Reason*, as quoted in K. M. Stokes, 1992, *Critique of Economic Reason*, Monograph Series, Vol. 6, International University of Japan, Tokyo.
- McNeill, J. R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth-Century World*. W.W. Norton & Co., London, England. 421 pp.
- Menzel, P. 1994. *Material World: A Global Family Portrait*. Sierra Club Books, San Francisco, CA. 255 pp.
- National Research Council. 1997. *Toward a Sustainable Future: Addressing the Long-Term Effects of Motor Vehicle Transportation on Climate and Ecology*. National Academy Press, Washington, DC. 259 pp.
- Nattrass, B. and M. Altomare. 1999. *The Natural Step for Business*. New Society Publishers, Gabriola Island, British Columbia, Canada. 222 pp.
- Odum, W. E. 1982. Environmental degradation and the tyranny of small decisions. *BioScience* 32(9):728-729.
- Parton, G. 1999. A letter to environmentalists about friendship. *The Trumpeter* 15(IUI CODE 6.15.15).
- Postel, S. 1999. *Pillars of Sand: Can the Irrigation Miracle Last?* W.W. Norton & Co., New York. 312 pp.
- Ray, P. H. and S. R. Anderson. 2000. *The Cultural Creatives*. Harmony Books (Random House), New York. 370 pp.
- Romo, R. 2000. Border growth projections run water table dry. *The Albuquerque Journal* Nov11:E3.
- Segerstråle, U. 2000. *Defenders of the Truth: The Battle for Science in the Sociobiology Debate and Beyond*. Oxford University Press, Oxford, UK. 493 pp.
- Soussan, T. 2000. Drugs detected in water. *The Albuquerque Journal* Sept15:A1-A2.
- Teilhard de Chardin, P. 1965. *Hymn of the Universe*. Harper and Row, New York.
- Vitousek, P. M., P. R. Ehrlich, A. H. Ehrlich, and P. A. Matson. 1996. Human appropriation of the products of photosynthesis. *BioScience* 36:368-373.
- Wackernagel, M. and W. Rees. 1996. *Our Ecological Footprint: Reducing Human Impact on the Earth*. The New Catalyst Press, New Society Publishers, Gabriola Island, B.C., Canada. 160 pp.
- Wilson, E. O. 1998. *Consilience: The Unity of Knowledge*. Alfred A. Knopf, Inc., New York.