

An Earth-Based Ethic for Humanity

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Editor's Note: This article was prepared for the German periodical **Natur und Kultur: Transdisziplinäre Zeitschrift für ökologische Nachhaltigkeit**. It has been translated into German and published in Volume 1(2): 106-120. 2000. It therefore includes material from several other texts by Stan Rowe that are posted on this site.

Introduction

The "Nature" directly experienced by humans is Planet Earth. Beginning as a fiery cloud of dust, Earth cooled, solidified, then over four and a half billion years produced on its surface an amazing diversity of seas and continents, soils and atmospheric climates, rivers and lakes, forests and grasslands with teeming bacteria, protista, fungi, plants, animals. From this inorganic-and-organic complex a featherless biped with a big brain emerged, a conscious being able to remember the past and imagine the future, a being formed both by Nature and by Culture with hopes and fears centered on the self.

Like every other species, Homo sapiens tends to be selfish and this dangerous trait is reinforced by culture. It seems natural to care first for ourselves and our families, then friends, ethnic relatives, and vaguely beyond them the whole human world community. From these feelings has come an ethic of humanism that urges sympathy for others regardless of race, color, sex, or creed. It is the egalitarian message of the world religions: love thy neighbor, care for the unfortunate, improve the human condition wherever there is poverty, ignorance, sickness and suffering. Few can imagine anything higher or more virtuous. Albert Schweitzer preached reverence for all life-forms, not just for people, yet when he died he was praised as a great humanist!

Humanism served humanity well when numbers were small and technology limited. It is still valuable insofar as it teaches benevolence, justice, and mercy toward one another. Beyond that, humanism is a danger to the planet and to ourselves because of its excessive narrowness. It has outlived its usefulness. One species, infatuated with itself to the exclusion of 20 or 30 million other co-evolved life-forms and their life-giving milieu, is putting all Earth at risk.

A broader, more encompassing, outward-looking ethic is needed. Such a post-humanist ethic is unlikely to come from religious traditions that are inward-looking, centered on humanity. This essay explains the basis for a faith and an ethic focused not on the human species but on its source and support, the Earth. Ecology points the way.

Several Meanings of "Ecology"

The common definition of "ecology" is study of organisms in relation to their environments. Tschulok (1910) placed it as one of seven different viewpoints necessary for the understanding of biological objects, these being: morphology, taxonomy, chorology, chronology, genetics, physiology (inward functional relationships), and ecology (outward functional relationships). The outline is useful and many have commented on it (Rowe 1961).

A valuable aspect of Tschulok's scheme, not intended by the author, is its reverse use to answer the question, "What is a fully studiable object-in-nature?" Obviously ghosts and spirits, lacking morphology, fail the test. So do "populations" and "communities" because, as aggregates of organisms in space and/or in time, neither are functional entities. True they can be classified (taxonomy) and mapped (chorology) and studied for development over time (chronology). Also, from a distance, communities such as forests may even have a vague form in space (morphology). But they lack inner functions (physiology) and outer functions (ecology) because no matrix holds them together. If the matrix elements of Earth--that is, the air, soil, and water--are added to the aggregation of organisms called a "community" it becomes an "ecosystem," a fully studiable object.

This leads to the second meaning of ecology: the study of ecosystems as functional entities, each consisting of the matrix air, landform, soil, and water, plus the associated organic community. When in 1866 Haeckel coined the name "ecology" (from the Greek "oikos" meaning house or habitation), he conceived it as "household science" with organisms in the "household." On the same track, ecology has been defined as study of "nature's economy," and "study of the structure and function of nature" (Odum 1959). Odum's field work on the energetics and productivity of coral reefs, lakes, fresh-water springs, and tropical rain forests show the utility of studying land and water ecosystems as significant natural objects.

Rowe & Barnes (1994) suggested the term "geoecosystem" for the Earth-centered systems that occupy specific geographic places. Geoecosystems are three-dimensional sectors of the Earth or ecosphere, recognized and bounded at different scales--zonal, regional, or local--according to interest and purpose. Earth, the ecosphere, is the largest, most inclusive geoecosystem.

In summary, Ecology as "viewpoint" puts organisms at the center and then turns attention to the influences of what surrounds them. The premise is that "organisms have environments." More importantly, ecology as "field of study" places geoecosystems at the center and then, as one approach, attends to the interaction of their contents. The premise is that "ecosystems have organisms."

Notice in the latter idea the shift in focus from organisms to the surrounding creative systems of which they are parts. Thus in truth Ecosystems have people and not the other way around. To see ourselves as parts of something greater-than-human is a step toward a saving ethic, especially when that greater system is recognized as the source and support of life.

What is Life?

Chargaff (1997) criticized attempts "to explain" and "to understand" the meaning of "life" by reduction; that is, by appeals to chemistry and physics. Yet the dominant methodology of science is reductive, explaining phenomena in terms of their parts. Even Erwin Schrodinger placed his faith for the answer to "What Is Life?" in "other laws of physics hitherto unknown," rather than in laws of biology, or more reasonably in principles of ecology (Rowe 1998).

Language is to blame. We think by means of metaphors (Lakoff and Johnson 1980) and the reigning metaphor for "life" is "organism." A brief look at the scientific literature shows the two words are used interchangeably; no difference is drawn between them. Therefore when scientists address the "problem of life" they automatically and unquestioningly turn their attention to organisms, especially to simple organisms, asking the explanatory "how" question: "How did this primitive bacterium get put together?"

Two answers are currently popular: the Darwinian and what will here be called the Kauffmanian, after one of its chief exponents (Kauffman 1995). The first proposes that complex replicating molecules ("early life") formed by accident in a chemical sea-soup. They were cobbled by random shots-in-the-dark of some cosmic staple-gun (irradiation, lightning, vulcanism), and mutation with natural selection did the rest. The second proposes that replicating molecules formed because of matter's self-organizing tendencies in energetic environments. Out of the sea-soup came ever more elaborate dissipative structures, autocatalytic sets and autopoietic systems, fine-tuned thereafter by natural selection.

In both explanations, a reductive view of "life" is forced by the metaphor "organism," because how an organism is organized and how it functions are questions that direct attention to internal mechanisms: to structure, anatomy, physiology. From this dubious assumption it follows that the answer to "life" must lie somewhere within the organism, inside the cell, inside the organelle. Thus the investigator's focus is drawn down to the makeup and function of "complex molecules" within organisms.

From the reductive view, what candidates present themselves as the initiators of life? DNA and RNA head the list. From there it is a simple step to the belief that molecular biology will find the answer, solving "the problem of life"--given sufficient time and money. But is the metaphor "Life = Organism" as close to reality as we can get?

The Biological Fallacy: Life = Organisms

The October 1994 issue of the journal, *Scientific American*, titled "Life in the Universe," gave an account of how planet Earth and organic earthlings--our creaturely relatives and ourselves--came to be. Throughout the text the words "organisms" and "life" were used as synonyms. Two contributors discussed the meaning of the concept "life." Robert Kates suggested that "life is simply organic matter capable of reproducing itself," or "the mix of living things that fill the places we are familiar with." Carl Sagan pointed out the weaknesses of current definitions, implying that an acceptable meaning for "life" has yet to be found. Perhaps the answer lies in the creative powers of the Ecosphere.

Organisms can be "alive" one moment and "dead" the next with no quantitative difference. Some unknown quality of organization is emergent in the "alive" but wanting in the "dead." A still stronger reason exists for not using "organisms" and "life" interchangeably. Organisms possess "aliveness" only in the context of "life-support systems." If such systems are necessary for "life" should they not be considered fundamental parts of it? Evidently the narrow category "organism" is only a metaphor for "life" and an incomplete one at that.

Whatever that mysterious organizing principle called "life" may be, its immediate source is clearly the Ecosphere. Paleontology and ecology demonstrate that organisms and their earthly matrixes are symbiotic and inseparable, differentiated only by our cheating sense of sight. The Biological Fallacy, equating organisms with life, is the result of a faulty inside-the-system view (Rowe 1992).

Consider the different experiences of seeing a system from the outside and from the inside. Looking through a microscope at a slice of plant tissue the student sees spaces bounded by walls and knows, from the instructor, that s/he is seeing unitary things called cells. Next, looking within, s/he is mentally prepared to see parts: nuclei, plastids, mitochondria, starch grains, streaming cytoplasm, particles dancing in Brownian movement. The identification of parts is contingent on prior definition of the whole, as shown by a simple thought experiment.

Suppose that instructor and student, before seeing cells from the outside, were reduced to microscopic size and placed within a cell. The teacher hands binoculars to the student and asks, "What do you see?" Sight from within particularizes. Lacking the outside perspective that reveals the whole, the student will see the cell contents as separate and unconnected objects. S/he might then logically identify the dividing, reproducing organelles as alive and their cytoplasmic matrix, vacuoles and other inclusions as dead. The idea that the totality is alive, so obvious from the outside, is not apparent.

For thousands of years we people have been viewers immersed in the ecosphere, deep-air animals living at the phase boundaries where air and water meet land, mistakenly identifying all manner of things as "organic" and "inorganic," "biotic" and "abiotic," "animate" and "inanimate," "living" and "dead." Dictionaries full of nouns show the efficiency with which we have thought the world to pieces. Around our ignorant taxonomy we have constructed religions, philosophies and sciences that fragment and departmentalize a global ecosystem whose "aliveness" is as much expressed in its improbable atmosphere, crustal rocks, seas, soils and sediments as in organisms. When did life begin? When did any kind of creative organization begin? Perhaps when the ecosphere came into existence. Perhaps even earlier at time zero: the Big Bang.

The idea that vitality characterizes more than the organic parts of the Ecosphere suggests that it is the fundamental organizing entity. The Ecosphere is not a super-organism as Lovelock (1988) has argued, if only because it does not match the definition of "organism" printed in biology texts. Rather it is supra-organic: a higher level of organization than the plants and animals it envelops. The lively Ecosphere gives the lie to those who see the world's reality as little more than a competitive arena, for without some degree of cooperation among its multitude of parts the creativity of the planet could not have been expressed nor maintained. As in human affairs, symbiosis is as much a reality as competition and probably far more important. Further, locating Life in the Ecosphere rather than in the one organic part is a healthy counterbalance to the reductive explanations that dominates science.

Returning to metaphors, we cannot dispense with them because they are the tools of mind and imagination. In a sense, the history of Western thought--its philosophy and science--is a search for metaphors "that work," that prove themselves "better fits" to our shared reality than others that we discard. By thinking ecologically, Earth not Organism emerges as the better metaphor for Life.

Some Implications of the Concept "Earth = Life."

Many human attitudes to the planet hinge on the idea that only organisms are imbued with life. Traditionally Earth has been thought to consist of relatively unimportant "dead" elements, collectively called "environment," and very important entities: organisms, living beings, things like us. From this misconception the conclusion follows that only biodiversity is valuable and worthy of conservation. And of all the diversity of organisms, by human consensus, humans are the most important. Meanwhile air, sea and land, with their misnamed "raw materials" and "natural

resources," are open for business, exploited without restraint. But if Earth = Life, the foolishness of such ideas is exposed.

Important implications follow from the metaphorical linking of Ecosphere with Life, as listed below:

- (1) The world did not suddenly "come alive" three and a half billion years ago from a smear of bacteria on its hitherto "dead" surface. The first complex protein molecules, the first bacteria, gained their vitality from the animated seas of a lively Gaia.
- (2) When the self-organizing powers of Earth are recognized, the idea that "life" arrived from Mars or some other extra-terrestrial source as a bacterium or other organism is superfluous.
- (3) The misnamed "abiotic environment" of air-water-land that keeps organisms alive, and from which people draw the so-called "raw materials" and "natural resources," with a pay-back of industrial pollutants and garbage, merits special care and protection as the "Mother of All Aliveness."
- (4) "Environment," hitherto conceived as a packet of abstracted factors (light, heat, moisture, nutrients) influencing organisms, is reinterpreted as the volumetric geoecosystems (geographic sectors of the Ecosphere) within which organisms function as animated parts.
- (5) Anthropocentrism (the philosophy that only humans matter) and Biocentrism (the philosophy that only organisms matter) are revealed as untruths and receive the jolting shake-up they deserve. Ecocentrism, the philosophical view that places Earth as the central reality, comes to the fore, as does Ecology defined as study of Earth's geographic sectors and their inorganic/organic contents which include humans and their cultures.
- (6) The various arts and sciences are ranked according to their contributions to Ecology (also named "global ecology," "ecospherics" or "ecosystemology"). For example, Anthropology, Biology and organic Chemistry are organic sub-discipline of Ecology while inorganic Chemistry and Physics are inorganic sub-disciplines of Ecology.
- (7) Preservation of "life" means protection of Nature-as-Earth against human simplifying activities that destroy the diversity of geoecosystems. As a corollary, preservation of organic species (including Homo sapiens) can only be successful with preservation of the evolving geoecosystems of which they are parts.
- (8) An Earth ethic is the reasonable replacement for the destructive ethic of humanism, shifting the focus of importance from the one species Homo sapiens to the living Ecosphere, its geoecosystems, and their inorganic/organic contents.

The Philosophical Basis for Ecospheric Ethics

Ethics is the branch of philosophy that studies and evaluates human conduct in the light of moral principles, the latter conceived to be either inborn matters of conscience or powers of discrimination acquired by experience.

Ethics and moral principles concern what is right or wrong, good or bad. In general they guide conduct away from egoism toward altruism, away from selfishness toward unselfishness, away from insensitivity toward sympathy. Melden (1967) observed that acting out of self-interest is not a moral reason, while Warnock (1971) claimed that the proper general object of morality is to expand our

sympathies so as to reduce the damage inherent in narrowness of knowledge and of limited interests. Ethical action is directed to the welfare of things other than self. Thus the "ethic of selfishness" that is said to guide the free-market system is a contradiction in terms.

Two centuries ago the philosopher David Hume (1900) took the view that altruism--that is, care for things other than the self--is a natural human attribute. He argued that feelings of esteem, respect, regard, kinship, affection and sympathy are as natural to people as self-love. He suggested that the expression and scope of such feelings depend on how reason and understanding inform them. Although he had society in mind as the beneficiary of its citizens' altruistic sentiments, there is no reason why benevolence should stop with the human race.

Today, ideas of self-interest--either egocentric or, by extension, ethnocentric or homocentric--underlie most ethical theories. They stress the prudent utility of acting well, in the conscious or unconscious interest of the self, the society, and the human species. The biological sciences that explain the world in terms of selfish genes and competitive species lend their support. Darwin proposed that ethical systems have evolved to facilitate social cohesion, and on this basis Aldo Leopold (1949) justified a "Land Ethic" as advantageous for human survival. According to him, individuals may think that altruism impels them to respect the Land as an ecological community but the hidden reason is social expediency. True or not, Leopold's recommendation of charitable respect and admiration for the land is wise.

Whether one believes with Hume that altruistic feelings are simply generous impulses, or with Darwin and Leopold that they represent time-tested guides to racial survival, both pose the same ethical question for the individual person: What beyond my self is important? On what larger group, society, community or world shall I center my altruistic sentiments of sympathy and compassion?

The proposition advanced here is that the planet, the living Ecosphere (literally the Homesphere), is the reality of greatest worth and merit that humans can know intimately and directly through the senses. Therefore the Ecosphere is the preeminent moral object. Compared to it all other realities are insignificant. Further, humanity will never adequately "protect the environment" until it is recognized that the Ecosphere's values surpass the high status that the human species confers on itself.

Because moral standards and ethical actions are tied to beliefs, faiths and understandings, they are human creations, formed by people and therefore homomorphic (anthropomorphic). This does not mean that they are necessarily homocentric (anthropocentric), focused only on the human race (Hanson 1989). Ethical action can be extended to whatever we choose, whenever and wherever the values and importance of things outside our skins are recognized. Specifically, we need not confine moral concerns to those protoplasmic fragments of the world that are conscious or sentient, for such organic parts though important have no monopoly on importance. Even biocentrism that limits value-laden concerns to people, to endangered species, to animal rights and to biological phenomena in general (as in the phrase "preserving biodiversity") is a dangerous detour from the necessary goal, which is placing primary value on the largest and most complete realities that create and sustain all of life.

Ecospheric ethics is based on the ecological valuation of Earth as source and support of humanity. It is strengthened by the belief and faith that what has for years been thought of as mere "environment" is a reality more important than me, you, and all of us. Humans are parts of the Ecosphere, the whole that brings into being and sustains all organic creatures.

Only a strong sense of the Ecosphere's creative and sustaining values can make it the ethical object of prime importance for humanity. Confirmed as such, its maintenance will merit high-priority consideration in national and international policy matters, legislation, and global agreements.

The Flaw of "Ethics by Extension"

Ever since the Renaissance the individual has been glorified. This dominant political ideology makes difficult the valuing of anything else. Charters of Rights for the individual often over-rule responsible actions aimed at strengthening the social and ecological fabric. If the individual is the centre of the universe then the only way that other things can be brought within the ethical ambit is by extension to "things like us." The scope of traditional ethics therefore hinges on what is accepted as "like us." To what shall ethical obligations be extended? Following Hume (idem), much depends on education, insight and sensitivity.

Callicott (1989) summarized the case for ethical extensionism, pointing out that Kant's criterion for ethical extension was rationality; only people qualified as moral objects and the rest of creation was grist for the human mill. In modern times, the "animal rights" philosophers have attempted to extend the ethical boundary to include primate relatives, then mammals, then all sentient creatures.

Ethics-by-extension soon runs into the problem of diminishing returns. With each expansion, with each enlargement of the circle of concern, the ethical impulse--strong at the centre--is more and more attenuated. Just as light intensity decreases as the square of the distance from its source, so benevolent feelings rapidly fade away with distance from the self. For example, Callicott (1989) argued strongly for acceptance of Leopold's Land Ethic as a logical extension from the individual to the ecological community. Having made the case, he then proceeded to undercut it by stating that Land, the ecological community, is secondary in importance to ethical objects closer to the centre: friends and relations. Faced with the charge that a Land Ethic might over-rule the rights of people (as in many circumstances it should), he surrendered without a shot, abandoning the Land in favour of the rights of Homo sapiens. Deep Ecologists have the same problem when they argue that "extension of the sense of self" will provide an Earth-saving ethic. Clearly ethics-by-extension as an expression of homocentrism is unlikely to change the status quo.

Suppose that the planetary Ecosphere within which we live, move and have our being is taken as the primary reality. Suppose it is accepted as inherently valuable, an ethical thing-in-itself, producing life and continuously sustaining its many organic forms which are, however, secondary in significance. Such a novel viewpoint brings a radical shift in the orientation of ethical thought. No longer does it proceed by extension from the inside outward, from the self to like organisms, but instead from the outside in, from the Ecosphere to its contents. Then the foremost ethical question is reframed: How shall the health, beauty, diversity and permanency of the Ecosphere and its sectoral ecosystems be secured? After that, secondly, how shall people and societies fit their activities creatively to the Ecosphere's maintenance? A greater-than-human goal guides human goals.

The saving attitude is ecocentrism that identifies the Ecosphere as the centre. This is the focal point for ethics, for art, and for religion recast in an Earth-revering form.

Religions and Ecospheric Ethics

A post-humanist "environmental ethic" is unlikely to be born from the dominant world traditions. Their religious foundations, whether ancient or modern, Western, Eastern or in-between, are

necessarily unecologic because they are human-centered. That fact controls their form and function and their inability to change. The primary concerns of the world religions are Man (in the gendered sense) and, by paternal extension, God (or gods), usually involving some form of covenant or salvational bargain. Their chief value, of undoubted merit for our species, is their teaching of justice and mercy toward each other. Religious scriptures are historical and sociological, narrowly focused on the welfare of humanity. Ecological texts they are not, nor were they ever meant to be.

Were religions ecologic at their roots, they would be focused outward on the Ecosphere: the surrounding reality that evolved humans, surrounds humans, sustains humans, and includes humans along with 30 million other organic species. They would have a penetrating vision of this nurturing Earth as senior partner, with people as junior partner. They would take seriously the Judaic insistence on the importance of survival in the here-and-now through a regimen of plain living, rather than carelessly eating up the Earth while obsessing about such fantasies as original sin, reincarnation, and soul-salvation in a fancied hereafter. Eden-wildernesses would be the recognized creative centers, and the humanized surroundings would daily pay tribute to them.

The virtues of religions are many, but they do not compensate for their deficiencies any more than a criminal wins pardon on the evidence that he has always been kind to his mother. In one way or another all faiths have sponsored a war on the Ecosphere. No world religions challenge agriculture: the earliest and still the major battle field where ecodiversity and biodiversity are the adversaries. No religions challenge human population over-growth, a fundamental sin against the rest of creation.

The basic cause of global ecological disaster is homocentrism, and the best environmental ethic the homocentric faiths have been able to muster is stewardship as defined in the Genesis text: "And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it." Stewardship puts humans firmly in charge as dressers and keepers, as managers tending Earth's assets in such ways as keep the goods flowing for the one preeminent species, perhaps saving a bit but only because it may be useful some rainy day.

Stewardship of Earth will fail because, sooner or later, those in political power lack the good sense to see ahead, or are forced by hard times to liquidate Earth's "resources" for the gratification of the moment. Humans fixated on their own welfare, whether on their bodies in this world or their souls in the next, cannot help but be injurious to Earth as the prime ethical reality. History shows that, rather than gratefully accepting the golden eggs, people have again and again killed the fabled goose for the best of all reasons: to make busy-work jobs, to make a minority rich, to satisfy frivolous wants far beyond the provision of necessities. The message is writ large in the current economic system that discounts the future and encourages grabbing what you can, because "For me the world was made" and I want my slice of it right now.

An Ecological Faith

Clearly a new faith is needed, a faith in other-than-human realities, a faith in the most important reality: planet Earth, Home-globe, Ecosphere. It has sponsored the emergence of primates and then humans, bringing the latter to their present self-conscious state. It is the source of life and of creativity.

The beginning and the ending, at least for humanity, is right here in this palpable matrix of air-water-soil. Call the faith a New Pantheism, Ecotheism, Hylotheism, Hylozoism, Theological Naturalism,

or whatever, as long as it places the source of spiritual values in a close relationship to Earth/Ecosphere from which we came and to which we all return.

Most relevant is the little-known faith called Animism, formerly embraced in various forms by aboriginal foragers, hunters and gatherers, by uncivilized "heathens" (people of the heather) who lived close to the natural world. Animism (from "anima" meaning "soul") attributes the synonyms "spirit" and "life" to all Nature. For Earth-conscious tribal people, Animism is a participative and respectful view of humankind's relationship to the rest of creation.

Levi-Strauss (1962) criticized Western anthropocentrism and championed the humble animistic viewpoint of tribal people. For them "a well-ordered harmony does not begin with the self, but rather places the world before life, life before man, the respect for other beings before the love of self." To place the world and life ahead of humanity is not misanthropy, said Levi-Strauss, but rather a critique of the strutting and shameless arrogance that makes man the lord and master of creation. The rights that one can and should recognize for mankind are only a special case of those rights that must be granted to the creative force of life. Care about mankind without simultaneous solidarity-like caring for all other forms of life, he said, leads mankind to self-oppression and self-exploitation. The anchor-point for a "principled humility" must be found in a greater-than-human reality, one that transcends every culture and every ingrown morality.

Animism recognizes the world as "a greater-than-human reality." Why has it been treated with disdain by the world religions? Saul (1994) explained it this way: "What bothers the intellectual religions about Animism is not the idea of life in everything, but that humans are therefore no more than a constituent part of a living whole which is the Earth. That this view denies special rights and powers to the human is upsetting. That it denies special rights and powers to the structure of society is unacceptable. Large organized societies are dependent on the separation of the human race from all the rest, an abstract idea that frees people to act as if *Homo sapiens* is not limited by physical realities. Without this liberation, much of our progress would not have been possible." Saul is scathingly critical of what humans currently call "progress," and Gray (1995) has named it a major block on the path to an ecocentric post-humanism.

Humanity needs to regain some form of Animism for the preservation of its environment and itself. In different times and places the source of life has been attributed to the air (as in psyche and spirit), to the earth (humans from humus), to water, to fire, as well as to organisms. Like the blind men identifying the elephant by touch, each separate part has been the imagined essential part of the whole. Now that Earth has been seen from space as an integrated unit, a living blue-and-white cell, the logic of attributing the creative, synthesizing essence called "life" to it is compelling. And if everything that surrounds people is imbued with life, it all commands reverence and respect. In this way, in a secular society, the sense of the spiritual can be recaptured.

In the words of Capra (1996), "When the concept of the human spirit is understood as the mode of consciousness in which the individual feels a sense of belonging, of connectedness to the cosmos as a whole (and, my addition, "to the Earth in particular") it becomes clear that ecological awareness is spiritual in its deepest essence."

A Purpose for Humanity

The ecological perspective suggests the logic of viewing every system of interest in the context of an enveloping system, in the relationship of part to whole. Small systems are enclosed by larger systems, and these in turn are enveloped by still larger systems in a hierarchy of containment up to

the topmost level, the Ecosphere. A noteworthy aspect of such a hierarchy is that each of Earth's sub-systems appears to be autonomous when viewed as a thing-in-itself, but when viewed ecologically each is seen to play a harmonious role as part of the larger enclosing system which, to some extent, sets limits to its subsystems' activities. The whole ordains compliance among its parts. Thus the world that many see as primarily competitive at the biological level of organisms is transformed at the ecological level of ecosystems into one of symbiosis and cooperation.

Consider the sequence cell, tissue, organ, organism, and geoecosystem as "Chinese boxes" of increasing size, each enclosed by its larger neighbor. An organ, such as the heart, is composed of tissues and cells and is itself enclosed by the organism's body. When interest is in how the heart works (how does it function?), attention is physiological and reductive, examining cellular tissues. When the interest is in the purpose of the heart (what is its function?), attention is ecological with reference to the body of which the organ is a functioning part. Here is a clue to humanity's place in the planet.

As a general rule in hierarchical arrangements of systems-within-systems, the mechanism of any system is found in its sub-systems, by reduction to physiology and anatomy. But the role or niche or purpose of any system is found ecologically, by reference to the supra-system of which it is a component. Surrounded by Earth, embedded in its ecosystems, what is humanity's purpose?

No human can say what humanity's role may be as an organic sub-system within Earth and its geoecosystems. The part can never determine the "purpose" of the levels of organization above it. Nevertheless the analogy between heart-body and humanity-Earth is instructive. Just as the role of the heart is to keep the body healthy, so--as a minimum, recognizing our ignorance--the role of the human part is to keep healthy the Earth, the largest whole with which we are in direct contact. By neglect of that goal, humanity has become pathological. The Earth is running a fever, and we are the virus.

Learning from Earth

The wildlife biologist, Aldo Leopold (idem) early in his career was an enthusiastic killer of cougars, coyotes, wolves and grizzly bears, because these predators decreased the game available to human hunters. Eventually he saw the error of his ways and became a fervent preservationist. His best known work, *A Sand County Almanac*, is the source of many wise sayings such as: "Recreational development is not a job of building roads into lovely country, but of building receptivity into the still unlovely human mind." Another of his truths: "Land is not a commodity that belongs to us; land is a community to which we belong." And this one: "We all strive for safety, prosperity, comfort, long life---and dullness."

No one aims at a dull life, but dullness is usually the result of a meaningless life with no higher goals than the self. Accepting Leopold's analysis, the way to avoid dullness is to take more chances, opt for less safety, less prosperity, and less comfort--even if it means a shorter life! Only when people get serious about changing the way they interact with the Earth--locally, regionally, nationally and globally--will the future of the human race brighten with fundamental meaning. When and if that happens it is certain that the adjective "less" will figure prominently in prevailing life-styles and in the educational, legal, political and economic systems.

In one of his essays Leopold advocated "Thinking Like a Mountain." Until people learn that long, quiet view of existence, he said, we shall "have dustbowls, and rivers washing the future into the sea." Today with deeper knowledge, Leopold's idea can be extended to include humanity.

Much more than "Thinking Like A Mountain," humanity needs to "Think Like The Ecosphere." Until people begin to search for wisdom in Earth and in its enveloping ecosystems, taking the long and wide view of the living matrix (air, land, water, and organic communities) in which they live, move, and have their being, the surrounding Earth "environment" will continue to deteriorate. Industrial civilization will keep spreading, ecodiversity and biodiversity will decrease, forests will be simplified into plantations, high-yield agriculture will accelerate soil erosion, water contamination will increase. A host of "environmental" ills will beset humanity as long as the prevalent viewpoint remains inward-looking, short-term and confined primarily to Homo sapiens.

Trying to "Think Like an Ecosystem" is, I believe, one road to wisdom. It encourages taking our eyes off ourselves and our species, substituting for the human-centered perspective a new and radically different one. It implies that we, as Earthlings, can learn something from our source and support: the Earth.

Consider the global Ecosphere as the model ecosystem. From the outside it presents the appearance of a cell whose parts are beautifully matched, sustainably and equitably, fitted to each other by long evolution. All components, organic and inorganic, are inter-related, symbiotic, cooperative, dynamically harmonious. Contrast this with what culture teaches humans on the inside: that the world is fragmented, inequitable, competitive, and discordant. The social values of an inequitable, competitive economic system have been foisted on the Earth! "Thinking like an Ecosystem" turns this selfish viewpoint inside out. It offers an optimistic guide to conduct, rescuing humanity from the pessimism that rampant individualism and global capitalism foster.

Earth offers clues as to what humanity's best role can be. What can be learned from geoecosystems and from the ecosphere itself? One lesson seems to be balance and connectedness. Natural ecosystems maintain an internal stability, an equality between their parts, a dynamic balance between plants and soils and water, between populations of animals and available food and water, between production and consumption. This vital equilibrium between all parts is secured by a variety of strategies such as the negative feed-back controls of predation, and reduction in quality of food. Where humans enter the picture, educational and legal controls are needed to provide necessary negative feedback, maintaining the balance between people and the other components of Earth's ecosystems.

From Earth humanity can learn sustainability, for that apparently is a goal of the Ecosphere and of its continental and oceanic ecosystems. When left to themselves, ecosystems are self-maintaining, self-repairing and diversifying as they have been for millions of years. They only need "management" after we have set other-than-sustainability goals (such as maximum timber yield, maximum water yield, or maximum wildlife yield) for them, after we have "improved" their productivity to serve only human purposes, after we have changed them from complex systems to one-purpose simpler systems. Ecosystems naturally diversify, and so the fostering of diversity rather than simplicity, seems a worthy goal for all human cultures, including their various agri/cultures and silvi/cultures.

Conclusion

Today we know that this Earth planet in whose skin we live is an immense, vital, integrated system, the Ecosphere. Nothing that we can see, feel, hear, smell, or taste is separate. Everything has co-developed in complex interaction with the rest. The sense of wonder and affection that everyone feels for the beauty and bounty of Earth is the natural expression of our being a co-evolved part of it all.

The Earth, the Ecosphere, is large and diverse. Dividing it down into smaller segments called "geoecosystems" helps minds to grasp something of the surrounding reality. Mapping imposes fictional "walls" to separate out what seem to be different kinds of regional and local geoecosystems, representing these "walls" by boundary lines. When looking at such maps add the third dimension, visualize each map division as an integrated ecosystem "box:" air layer over soil/water layer with organisms the bacon-bits sandwiched between the two. Ecosystems take on the reality of three-dimensional volumes, complex units of nature, ourselves living within them, drawing life and livelihood from them.

Do we understand this miraculous Earth that we briefly occupy? No. Do we understand its marvellous parts, the terrestrial and aquatic ecosystems, in which we are embedded and some of whose parts we see? No. We have made some progress in understanding the intelligence of individual organisms, so that for example we know how to plant trees and help them grow. But we have no comprehension of the intelligence of ecosystems, of the forest ecosystems that humans have blithely destroyed since Sumerian times, some 6000 years ago, and still today.

Long ago the world's agricultural cultures turned away from their roots in Nature. For centuries now they have been guided by Humanism: a species-centered and, increasingly today, a self-centered philosophy. Its ethical sense, based on ideas of the preeminence of "personality" (including a personal God) has mostly been confined to inter-personal relationships. It has taken the world of Nature to be its adversary.

Ecology, founded on the outward vision, reminds humanity again that Nature is the source of the creativity called "life." Without Earth, humanity and its cultural achievements would not exist. From this an ethical imperative: to revere the surrounding world--Earth, the Ecosphere and its sectoral ecosystems--as greater, by many magnitudes of importance, than any single species so far brought forth.

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