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**ECONOMY AND ECOLOGY---
MORE ALIKE THAN DIFFERENT?
RECONCILING BIO-PHYSICO-SOCIO-ECONOMIC FORCES**

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I want to talk with you today about two life-giving and life-supporting forces of nature---economizing and ecologizing. In the popular press and in many scholarly studies, these two natural processes are seen as opposed to one another, but I shall be arguing that they are intertwined, mutually supportive, and inseparable. It is true that economy and ecology confront one another in nature, as well as in human affairs, and each process is capable of interfering with the other. But this "collision trait"---this ability to interfere and disrupt---is not the dominant character of the economy-ecology relationship. I shall try to show that they differ from one another mainly in the scale or magnitude of their evolutionary adaptational effects. I shall also want to show that ecosystems are inherently unstable and in constant flux, and that the notion of ecological "balance" or "equilibrium" is a phantom of human (and scholarly) imagination.

The presumption that economy and ecology are opposed to one another

has largely defined what we have come to recognize as "the environmental crisis" and has produced a desire to reconcile the clash of economic and ecological forces. Toward the end of my lecture, I shall speculate whether such reconciliation is feasible, given current public policies and their underlying preconceptions about human nature and human purpose.

Many (but certainly not all) accounts of "the environmental crisis" are both shallow and misleading. They are misleading because the predicted outcomes are either too dire or too optimistic; and they are shallow because the predicted future scenarios are at times not rooted in a full understanding of how nature works.

To remedy the resulting misconception of what happens at the economy-ecology interface, I want to propose a conceptual framework based upon both natural science and social science that (1) clarifies the nature of economizing and (2) defines the meaning and normative significance of ecology.

Thermodynamics, Economizing, and Entropy

Economizing and ecologizing arise from---and are a function of---the laws of thermodynamics. The first law says that the energy in any closed or isolated system is constant. It may be changed from one form of energy (a lump of coal, a piece of wood, a nuclear pile) to another (heat, gases, radiation products, and work), but the total amount of energy in the system remains the same through all

transformations. Thus, plants, animals, and humans take energy from their environment and convert it into artifacts and nutrients that power their living systems. For earthlings, total energy supply---the quantity---is no problem since it remains constant through time.

It is the second law of thermodynamics that poses the biggest threat to all economizing life forms. The second law says that energy quality is degraded as energy is used. Once burned, that lump of coal cannot be burned again. Its heat energy has warmed a room or caused steam to drive a piston, but in doing so the energy has been dispersed as heat and fumes and degraded into ash. It cannot be used a second time. Scientists call this energy degradation process "entropy." We live in an entropic universe and in an entropic planetary system, where life-sustaining energy becomes more and more difficult and expensive to acquire. Paradoxically, the more energy we (and our plant and animal companions) use, the less accessible it becomes, although the total amount remains constant.

Economizing and entropy thus stand as polar opposites. Effective economizers draw from the earth's energy pool to sustain their lives. Economizing is the only way they can survive, grow, develop, and flourish. But by the very act of economizing, they degrade and disperse the energy they use, creating what we now call "pollution" and wastes. All energy runs "downhill" and into a sink of unusable waste matter. Entropy's ultimate destination is random disorder and disintegration of matter and energy. So for every economizing gain made by a life

form, entropy degrades and diminishes the fund of accessible energy available to support life. Economizing, while absolutely essential for life, always increases entropy at some point within the total environmental system, thereby rendering life more difficult or less qualitative for all life forms.

Humans economize by producing net outputs or benefits from a given amount of resource inputs. One knows that economizing has occurred when it is possible, usually through cost-benefit analysis, to calculate and verify that a net output has been produced.

~~But economizing is not limited to human beings. Plants, animals, and all other life forms---bacteria, protocista, and fungi---also economize. They take in "resources" and produce a net output of energy which they use for survival and growth. These organic economizing activities are largely an outcome of genetically encoded processes. Human economizing also goes forward from a genetic base but benefits additionally from a cultural overlay. For both humans and non-human organisms, economizing is an essential, life-supporting activity.~~

Ecologizing, Life Networks, and Community

Economizing is only one of two life-support systems found in nature. The other is a process we now call ecologizing.

Life in all forms is intertwined with other life units. No living creature can or does exist in isolation from others. **This interlinkage is the essence of ecologi-**

cal processes, and is the root meaning of ecology. When ecologists look at nature, they see ~~connections, interrelationships~~, an interwoven web of life, and networks that relate life forms to each other and to their physical environment. These eco(logical)systems provide shelter, permit an efflorescence of life forms, ^{support} ~~support~~ collectivities of organic beings, and establish the interactions that living things have with their environmental homes. Thus, ecology resembles economy by supporting and sustaining life. As such, ecosystems represent a second vital counterbalance to entropic trends, offering a temporary respite from the ceaseless energy degradation brought on by entropic forces.

Besides interlinked life, ecological systems display three additional traits. One is **diversity of life**. Life forms---both living and extinct---are almost incomprehensively [§] numerous and variegated. The greater the variability, the larger and more expansive are the life potentials and life opportunities to be realized within the whole ecosystem. Put plainly, there is more to eat in a diverse environment, as food chains become longer and more complex. At the same time, mutually supportive bonds between various life forms are greater in number and variety. The more diverse the life web is, the greater the prospects for life within it. No better illustration exists than a tropical rain forest where literally millions of diverse species interact in a dense network of life forms.

Another ecological hallmark is **change through time**. The life webs that we call ecosystems are active, ever-shifting networks that never attain equilibrium

or "balance." ~~Even the cycles and regularities that govern ecosystem life and that at times appear to be stable are irregular in magnitude, timing, and impact.~~ The earth is a dynamic system, its continents continuously on the move, its temperatures fluctuating, its life forms still evolving, its ocean depths harboring fissures that spew out magma from the molten core, its atmosphere constantly re-sorted, renewed, and redistributed through both natural and human activities. The outward appearance of any ecosystem may be one of inertia and stability, although change within may be deep, fundamental, and far-ranging. Its inhabitants experience population fluctuations, genetic drift, genetic mutations, and both morphological and behavioral adjustments to natural selection pressures. The fact that ecological change tends to be conservative and carried out over long periods has created a false impression that natural systems are "balanced" and "in equilibrium," when in fact they are ceaselessly restive, agitated, and in ferment. A tidal pool or a quiet forest glade may seem to be a calm haven for those who live within, but just underneath the pool's surface or the forest's underlayer a fierce and unrelenting struggle for life can be discovered, where species wax and wane, temperatures fluctuate up and down, new predators intrude, pools dry up, forest fires rage, hurricanes and tornadoes forcibly rearrange the stage on which life is played out or ended or renewed.

In spite of continual change, ecosystems form communities of mutually supportive and interlocked plants and animals (and sometimes, humans). This

fourth characteristic trait of ecology---**community**---is, in a sense, the culmination of ecological process. An ecological community, held together in spite of ~~(and because of)~~ its diversity and the forces working to change it, stabilizes and magnifies life at large within an ecosystem's boundaries. Those who shelter within that community feel entropic pressures less threatening than if they sought to survive outside it.

Thus can one understand that nature offers two life-supporting processes. One is **economizing** through which individual life units stave off entropy and death by effectively absorbing environmental energy and converting it to bone, tissue, stalk, root, branch, and vital life processes. A second kind of life-support activity is **ecologizing** that leads to diverse, interlinked, ever-changing communities of organisms whose chances of survival, growth, and development are multiplied by membership within such ecosystems.

The Interface of Economy and Ecology

The relationship between economizing and ecologizing is no simple matter. Both are forces of nature, although each is magnified and extended by human culture. Both make ~~our (that is, human)~~ life possible, although each is capable of working against the other. ~~After a close and extensive study of ecological theory and empirical field data, I have had to conclude that~~ it is not even clear that the two processes are distinct and separable. In truth, economizing and ecologizing

are ^{only} ~~but~~ different sides of a single process. If that can be shown, then much scholarly theory and public policy will have to be reformulated, for economic policy makers as well as environmental advocates have proceeded as if there is more opposition and contradiction than integration and harmony between the two.

To put it in its simplest terms, neither of these life-supporting forces --- economizing and ecologizing---can occur in the absence of the other. Remember that economizers draw energy from their environment. The environmental-ecological context is the source of the energy that sustains the economizer. All economizers live within ecosystems that contain the energy they seek. The ecosystem---that is, the ecological processes that surround the economizer---is its source of livelihood. Any and all economic transactions therefore are inherently ecological---that is, they occur within a context of ~~biotic~~ (living) and ~~abiotic~~ (non-living) forces that exert an influence on the outcome. ~~In fact, some ecologists say that the very substance of ecological process is little more than a pattern of economic transactions occurring among organisms within any ecosystem. An ecosystem is---and contains---and takes its meaning from---the interlinked efforts of its inhabitants to acquire the energy that will activate, sustain, and project into future generations their living genetic DNA substance. That is what the evolution of life forms is all about.~~

The logic that I am suggesting which connects economic and ecological phenomena can be stated in four propositions:

First, economy and ecology are intertwined, inseparable, and supportive of one another.

Second, both are life-supporting and thus they countervail ~~inexorable~~ entropic trends that carry all energy and matter toward degradation, disintegration, and random dispersal.

Third, all life forms within any ecosystem are constantly engaged in an economizing search for life-sustaining energy^(nutrients)---a search that is enhanced and augmented because it occurs only within ecological networks. The dominant feature of any ecosystem is the dense network of economizing activities generated by its inhabitants.

Fourth, it is therefore possible to conclude that the ties that bind economy and ecology together are stronger and more enduring than any tendencies to set them apart or in opposition to one another. Considered separately, they have no meaning. Each depends on the other. Neither can function without the other.

This puzzling and unexpected outcome not only differs sharply from popular notions but seems to contradict both common sense and scholarly insights about the nature of today's environmental problems. If economy and ecology are mutually supportive, why then is there an "environmental crisis" at all? Do we not have to worry about acid rain, the decimation of the earth's remaining rain forests, the pollution of the oceans and rivers, the scarring of the land on which food crops are cultivated, the noxious fumes and toxic substances generated by busi-

ness corporations and government (largely military) enterprises, the poisoning of the atmosphere and the thinning of the earth's protective ozone layer, and many other well known environmental threats? Quite obviously, these are genuine concerns and fundamental problems that deserve to be addressed through public and private policies.

What appears to be a contradiction between scientific conclusions and perceived environmental problems can be explained by noting a simple but profound fact ^{of nature:} economizing processes are not all the same. Some are based on competition, while others depend on mutually beneficial linkages among cooperating life forms. In other words, the differences of greatest evolutionary significance within the economy-ecology world are differences in economizing styles found within ecosystems, not distinctions between economizing and ecologizing processes themselves.

Before identifying these all-important economizing styles, bear in mind the two cardinal relationships established by the previous discussion:

1. All economizing is made possible by and constrained within ecological systems.

2. All ecological linkages among diverse life forms within any ecosystem are forms of economizing. ~~Put another way, all biotic (living) relationships in ecosystems are economizing in nature and effect. (Additionally, nonbiotic forces—climatological, seasonal cycles, geochemical processes, etc.—also affect~~

~~the types, number, and character of ecological networks formed.)~~

Competition and Symbiosis in Nature

Charles Darwin's emphasis on natural selection as the key process of evolutionary change is responsible for the strong role imparted to competition in nature. As organisms seek out vital food sources, they frequently encounter other organisms struggling to draw energy from the same energy pool. The strongest, quickest, most assertive, and most efficient beat out the weak, slow, placid, and inefficient feeders. Thus, the "fittest" survive as economizers, passing their superior traits on to future generations. ^{behavioral} The neo-Darwinist theories of Richard

~~Dawkins that emphasize the role played by genes only reinforce the competitive bias found in ecological and evolutionary theory. Darwin did not understand genetics (he did not know Gregor Mendel nor did he read about Mendel's pioneering work on genetic transmission), so it was Dawkins who has shown how gene-driven processes contribute to competitive fitness and survival. A lineage of "fit" organisms may hold entropy at bay over long periods of time, although of course each individual member succumbs to entropic forces and dies sooner or later.~~

This kind of relatively benign competition among the members of a single species is supplemented by a fiercer type---predation between species. Here, members of one species prey on another, frequently but not always ending the prey's life at once as the predator appropriates the prey's energy for itself.

All organic competition for energy, of whatever form, is nothing but an economizing strategy. Most of it is a zero-sum game where one organism's gain is another's loss. Life taking life is as ubiquitous as it is unavoidable if there is to be life at all. ~~That is what ecologists, with a delicacy of technical language, mean when they talk about "food chains."~~ What they really mean is that A eats B (a source of energy) which eats C (another source of energy) which eats D (yet more energy) Life in the organic world is one long continuous breakfast-lunch-and-dinner---in short, an unbroken economizing energy-intake orgy.

But not all ecosystem economizing sets life against life. **Mutualistic economizing**---in which organisms interact in mutually beneficial ways---is far more common than competitive economizing. ~~Positive-sum games replace zero-sum games.~~ Helping behavior that supports life, rather than snuffing it out, is the hallmark of nature's mutualisms. Entropy's ever-looming pressures, it seems, can be momentarily outwitted by cooperation as well as, or perhaps even better than, by competition.

The key gain in all symbiotic contacts is increased fitness or adaptability for at least one of the organisms. For example, pollen-gathering bees and the plants whose flowers they seek out gain from the exchange---food for the bees and pollination of the flowering plant. The oxygenated air we breathe is produced by plants that simultaneously take in the carbon dioxide we exhale. Squirrels and birds, by feeding on or burying the fruit and nuts of trees, assist in seed dispersal

Our lives are

and survival of the trees. ~~Human life also is~~ completely dependent on mutually beneficial interactions with other living organisms. According to one leading ecologist, "any average human, is normally host to billions of symbiotic organisms belonging to perhaps a thousand different species" that aid digestion, fight off diseases, purge our bodies of toxins, and otherwise help to prolong our lives as well as those of our "guests."

~~While~~ ^M mutualisms like these directly augment the lives of symbiotically-linked individual organisms, ^{but} the overall effect of mutualisms is much broader. The entire ecosystem, and all life within it, are made more secure when mutualisms are abundant. ~~Without mutualistic ties and linkages, the earth would have fewer species, they would be far less diverse and ecologically adaptable, competition would be more intense, and the living would spend more energy in surviving than they presently do.~~ When mutualisms are plentiful and complex, life is more probable, more expansive, more supportive of greater biomass, and is channeled toward greater variety and larger potential. In the great struggle of life against entropy, mutualistic economizing is unquestionably superior to competitive economizing. The concerted, mutually beneficial, reciprocal relationships that saturate the natural world are, in fact, the very sinews that bind a community together into an integrated whole.

We are now at a point of summary. I have argued that economy and ecology are intertwined and mutually supportive natural processes. All economiz-

ing occurs within ecological systems, and ecological systems are little more than sets of economizing behaviors. While competitive economizing is widespread and supportive of individual lives and entire species, mutualistic economizing styles are even more common, more comprehensively constructed, and even more protective of organic life. Communities---~~whether of plants, animals, humans, or some combination of these~~---are based largely on mutualistic ties among their members. The more diverse and intertwined these communities are, the greater their ability to abate the negative entropic consequences of thermodynamic forces.

Reconciling Economy and Ecology

Environmental crises arise in nature and ⁱⁿ culture from two sources. First, the competitive economizing of some organisms threatens the life of competing organisms either directly or by damaging their habitat. A current example is the widespread destruction of the earth's rain forests, as farmers, lumber companies, developers, and governments seek the forests' resources of land, timber, and space, with an attendant loss by others of the forests' biodiversity and life-sustaining natural processes. ~~Other examples include potential global warming, the release of toxic substances into the air and waters, etc. Zero-sum results are typical of each of these environmental threats, some gain by economizing while others lose environmental security.~~

Environmental crises also occur when competitive economizing is allowed to override mutualistic economizing. A familiar example is the use of ozone-destroying compounds in highly profitable commercial and consumer products. When the harmful long-term ecological effects were discovered, an international agreement (the Montreal ^{Protocol} ~~Compact~~) was reached to reduce and eventually phase out these chemicals. Producers were persuaded that the mutually beneficial effects of substitutes were superior to their competitively-achieved economizing gains. In this instance, an environmental crisis was abated, not by denying or rejecting economizing but by shifting from competitive economizing to mutualistic economizing.

The "reconciliation" issue then becomes one of reconciling differing economizing styles, and the question is: Can mutualistic economizing be made to prevail over competitive economizing?

~~Before giving my answer to that question, I want to point out that~~ In one very important sense, there is no present environmental crisis at all---or none that is uniquely distinctive or unlike others that have occurred throughout the earth's vast and ancient past. Biologists have recorded five massive (global) extinctions of life, beginning 450 million years ago and extending to some 65 million years ago. The record is not clear about the causes, but one can presume that ecosystems collapsed and life was massively ended for many species.

Some say that our present environmental unease signals the beginning of a

sixth global extinction phase wherein competitive human economizing is rapidly destroying habitat, biodiversity, the resource base, and adversely affecting ecological processes that sustain life for all of earth's people and their life companions in the plant and animal worlds. But I would like to suggest that what appears to us as a "crisis" is nothing but the working out of natural evolutionary processes very much like those of the past. Humans have proved themselves to be magnificent competitive economizers, capable of reproducing and spreading throughout the entire habitable planet (and even temporarily to the earth's satellite), displacing, diminishing, and destroying other species almost at will. There is little reason to believe that this process will not continue until the human species completely dominates the earth, saturating all living space even to the point of a massive Malthusian-like self destruction because there are no natural "limits" to this kind of superior competitive economizing. Nor can one find written within nature any principle or law declaring such a potentially grim outcome unusual or "unnatural." To the contrary, competitive economizing, even of the most extreme brand, is nothing more than one of the many forms taken by an inexorable thermodynamic process. A kind of "reconciliation" of competing forces constantly occurs as ecosystems evolve, persist, and change. But reconciliation is not equivalent to the status quo or to the preservation of any given species, because natural selection and random events affect the life chances of all organisms within any ecosystem. Some live, others die. The dance of life and death goes on.

Adaptive niches appear and are filled, while other niches disappear along with their occupants. Nature imposes no purpose on this "reconciliation" process, nor does it favor one or several forms of life over another. It is entirely ad hoc, probabilistic, and laissez faire.

Why, then, do we believe that ^{today's} this particular environmental state of affairs is a "crisis" and that ways must be found to "reconcile" the forces that threaten global (and especially human) life? The answer, of course, is that human purpose has intervened. Humans played no part in those earlier massive extinctions for the simple reason that ^{humans} ~~they~~ had not yet appeared on the world scene. Today's reconciliation issue rests entirely on (1) the metaphysics of human purpose and (2) presumptions of human superiority.

When a consciously aware, purposive human element is introduced into ecosystems, "reconciliation" ^{is} ~~changes its~~ ^{is} meaning. It is no longer simply the working out of unfettered natural forces. Reconciliation comes to mean that both economizing and ecologizing should be adjusted to sustain human life and purpose. Human economizing is seen as superior to, or taking priority over, the economizing processes of all other life forms. So, too, are ecosystems that protect human life asserted to be more vital than the habitats that shelter non-human life. We humans perceive an environmental crisis and reject nature's ad hoc way of "reconciling" economizing styles and outcomes because we have been led to believe by religion and philosophy that human purposes and goals deserve

special standing, well beyond and above whatever fate nature decrees for other life forms.

The belief that nature should be controlled and dominated by humans for their own purposes is too well known and too widespread to require elaboration here. Instead, we need to ask ourselves another question: Is there any way to view human prospects without the presumption of human superiority and human control of nature?

The Case for Human Purpose and Human Survival

~~Though trite to note,~~ there is no case to be made for a world without human purpose. Humans have occupied the earth for some four million years. Within that span of time, they have tried to impose their will and their varied purposes on whatever part of nature they have encountered. ~~(Other organisms, of course, have done the same, although from a genetic, not a cultural, base.)~~ As noted ~~earlier,~~ humans' purposive economizing activities, both competitive and mutualistic, have carried the human genus forward with an astonishing vigor that shows no signs of abating.

~~Though arguable,~~ neither can a very strong case be made that humans are not superior to other life forms in many respects. Our symbolizing abilities, rooted within a highly developed brain and neurological system, undergird human culture, human technology, human language, and human intelligence—all dimensions in

which we outstrip other organisms by several orders of magnitude. Humans appear to be the only consciously aware form of life on earth---aware of our own ancient past on earth and within the surrounding universe, alert to the present's possibilities, and imaginative enough to explore potential scenarios of the future. No other organism even begins to approach the level of intelligence or the adaptational flexibility of the human species. In truth, we do many things better than---and do many things not done at all by---our life companions in the plant, animal, and bacterial worlds.

Moreover, human survival, provided it is achieved within the earth's ecological constraints, is a worthy goal and purpose, as most would agree. However, our views regarding human survival prospects are clouded by two cultural artifacts: (1) lack of agreement among human societies about the metaphysical meaning of human existence and human purpose, and (2) deep-seated religious beliefs that simultaneously claim the superiority of humans over all others on earth, while relegating earthly life to a lesser status than one to be discovered after death.¹ Cultural institutions and beliefs thus stand opposed to the necessities that nature imposes on human survival prospects. Where there is no global consensus about human life, its beginning, and its ultimate meaning; where there is controversy about controlling the crowding of ever-larger human

¹ The Biblical story of creation told in Genesis states the case for human superiority very baldly. Man was given "dominion" over all other living things and was instructed by God to "subdue" the earth. Genesis 1: 26, 28.

populations on the earth's finite resource base; where a single nation's pollution (as at Chernobyl) can be recklessly exported around the globe; where rich industrial nations subtly hint that the world's poor will have to suffer their fate in order to "sustain" an acceptable standard of living for the better-off portion of humanity; where a world fractured and torn by national, religious, and ethnic rivalries cannot generate a vision of global community---under such cultural conditions, nature's insistent messages about human survival are neither heard nor heeded.

I hasten to say that these are not problems for which we are likely to find satisfying and acceptable answers any time soon. I mention them only as a background for the final thought I wish to leave with you about the possibilities of reconciling a human future with the earth's ecological systems.

Consider

Nature's Community of Communities

The earth and all of the natural forces that play upon it---thermodynamic, climatological, geological, oceanic, biochemical, natural selection, genetic mutations and genetic drift, continental drift, ocean-floor spreading, volcanic action, asteroid impacts, solar energy flows, planetary gravitation, slow galactic evolution, the waxing and waning of species, and other such forces^{These} are the crucible from which human purposes and goals can be forged and shaped. These natural forces are what might be called "the community of communities" (or "~~the mother~~").

of all communities," to paraphrase Saddam Hussein, that paragon of environmental destructiveness). It seems safe to say that no human purpose or activity that is inconsistent with these natural forces—this large-scale, all-embracing natural network of interconnected life processes—can long serve human needs.

It follows that the most successful and most workable human institutions—economic, social, political, religious, educational, etc.—must find their place and function and justification within, rather than opposed to, nature's realm. That necessity poses a special challenge for socio-economists and their emergent socio-economics discipline. ^{Our} ~~Their~~ present efforts to broaden the scope of economic thought by emphasizing the sociocultural embeddedness of economic activity must be extended even further. The evidence is now compelling that biological and physical processes are an integral part of economic life. Acknowledging that preeminent scientific finding, and incorporating such perspectives into socio-economic theory, can only strengthen and enrich our understanding of economic activity. The economy is truly a full-blown expression of both nature and culture.²

Only when scholars, citizens, and policy makers become fully aware that socio-economic institutions are shaped by natural as well as cultural forces will we

² The most recent newsletter of The Society for the Advancement of Socio-Economics sets forth the official view that the economy "is embedded in society, polity, and culture" and that economic behavior is to be treated "as involving the whole person and all facets of society." No mention is made of nature as a factor that can affect both economic behavior and the embeddedness of the economy and society. See "What is Socio-Economics?", SASE News, Summer 1995, p. 4.

be able to free ourselves of the erroneous belief that they exist primarily to help humanity dominate and control nature. As noted earlier, we do---and should---attempt to direct natural forces in ways that sustain human life, but humanity has begun to learn that nature has its own ways and that they impose limits on all organic life. We are increasingly aware that human economic goal-seeking that contravenes and diminishes vital ecological processes is dangerous and foolhardy. Our economic goals and institutions, we now know, must be made to fit within, rather than to dominate and override, nature.

The only pathway that will lead to that destination is reliance on the principle of community embedded in the mutualistic networks found in nature. The vision of human community that suffuses socio-economic theory and communitarian policy is a ~~partial~~ reflection of nature's comprehensive mutualistic communities. That means that socio-economists and communitarians are closer than most others to developing theories and programs of action that build upon both natural and cultural foundations. Such a wider view of community is needed because, at present, the notion of human community typically falls far short of the broader reaches of nature's "community of communities." Our principal community allegiances are familial, ethnic, religious, social, and national---all cultural collectivities that do not match or stretch to the outer borders of nature's vast and complex biosphere.

It seems a worthy goal to work for a closer fit between nature and human

aspirations---a fit that would not elevate human purpose to a special status considered superior to all other living forms nor would it consign human will to a passive role within resurgent natural forces. Rather, the goal would be to find and sustain principles and practices of human community that are consistent with and supportive of nature's mosaic of mutualistic, cooperative ties. To their credit, communitarians and socio-economists have taken steps in that direction by emphasizing the importance of collective patterns of sociocultural cooperation within the economy and the polity. The next logical step seems obvious---to show that natural forces also sustain the kind of mutualistic cooperation needed if the human enterprise is to find its way in today's world. Armed with such an expanded view of human prospects, socio-economists and communitarians are likely to forge the theories and the action programs that will reconcile economy and ecology and restore human institutions to a more balanced posture within nature's realm.

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