An Introduction to

Ecovillage Economics:

Advocating a Human Scale

E. Christopher Mare

Antioch University Seattle

Whole Systems Design

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"Ecology is the ultimate, the true test of how the citizens of ecosystems make their living and sustain themselves over time. To live well, a realistic human economy must first provide care for what we require to live at all: a healthy environment with clean air, water and food." – Barbara Ward

Introduction

Ecovillages are “an integrated solution to the global social and ecological crisis, and are as appropriate to the industrial world, both urban and rural, as to the remaining two-thirds of the world. Ecovillages are in essence a modern attempt by humankind to live in harmony with nature and with each other. They represent a “leading edge” in the movement towards developing sustainable human settlements and provide a testing ground for new ideas, techniques and technologies which can then be integrated into the mainstream” (Gaia Trust, 1995, from their web site at www.gaia.org)

This incipient outline is constructively being interpreted in a diversity of ways: many variations of human settlement are currently being employed to serve as ecovillage models. Some of these models are no more than amended subdivisions, some are redesigned urban neighborhoods, and others still are far too small to be considered “villages” at all and are more appropriately labeled “cohousing developments,” “community land-trusts,” “ecohamlets/ecoaldeas,” or even just plain old “intentional communities.” The impetus to begin creating new, overtly sustainable settlement patterns to replace the outworn, unsustainable settlement pattern of civilization (centralized, city-based culture) is alive and stirring; yet there is not yet common agreement among the participants as to the qualities that distinguish an “ecovillage” from all others. The truth is, there does not yet exist anywhere in the world a full-featured, fully functioning, twenty-first century-potential ecovillage.

Traditional villages grew organically through time as what could be called “anthropomorphological outgrowths” of particular ecosystems. The socio-economic processes in these first true eco-villages were intimate translations of the needs of the people to maintain themselves over time. The traditional village socio-economic process evolved gradually, deliberately, reciprocally over time in partnership with the productivity of a healthy encompassing ecosystem, so it was sustainable by its very nature.

Twenty-first century ecovillages, out of necessity, may be constructed in one sweeping motion according to a well-conceived, well-designed, comprehensive plan. These developments will be, in effect, attempting to rapidly accelerate ecological succession by instituting “climax” stage socio-economic conditions as part of the design. This poses many interesting challenges, for a strong internal economy will be necessary if the ecovillage, in any of its manifesting forms, is to become at all “sustainable” – that is, maintaining its self-organization through time. Many of the emerging ecovillage

experiments are faltering because of inattention to establishing a secure economic base. Indeed, “economics” may be the crucial weak-link in current ecovillage theorizing, with broad-scale ecovillage implementation pending the resolution and formulation of a workable, replicable “ecovillage economics.”

For all these reasons, a Village Designer will benefit immensely from a thoughtful study of economics.

Managing the Household?

What exactly is "economics?" Daily we hear media reports that speak of the economy as if it were an entity of some kind, with a life of its own, as in "the economy is slowing down," or "the economy is in its n^{th} straight quarter of growth," or "it's good for the economy." While the media never quite explains just what this thing the economy *is*, we can judge by their reporting that it obviously is composed of many different sub-categories: inflation, the Federal Reserve, fiscal policy, unemployment, the federal budget deficit, interest rates, consumer confidence, world trade agreements, etc…and most of all – money! We are led to believe that the continued, uninterrupted growth of this abstract agglomeration – the economy – is necessary for our very survival.

Etymologically, 'economy' is derived from the Greek root *oikos,* or 'house,' combined with *nomos,* 'managing,' so that *oikonomia* originally meant "management of the household." This same meaning was still being applied to the Old French *economie*, once again referring to a human-scale, relational *process* for managing the needs of the immediate group. Economy didn't start out as a 'thing' in its own right, but rather as a means to an end: which was, effectively managing the household "so as to increase its use value to all members of the household over the long run" (Daly and Cobb, 1994, p. 138). Reflecting on the social context in which 'economy' originated, the 'household' was surely an extended family, a clan or a tribe, or perhaps a whole village of neighbors, people who really knew each other. It was certainly not an isolated nuclear household in the 20^{th} century suburban tradition. Economy began as a process of ensuring the well-being of the whole community, including its encompassing environs. There was not a *single* economy, under which the entire populace was subject, but rather a great *variety* of economies distributed across geographies, cultures, heritages, and seasons. In fact, every living organism, from the smallest bacteria to Gaia herself, engages in economic processes of some kind.

Another important word with the same Greek root is 'ecology,' the *study* of the household. First placed into general usage by the influential German biologist Ernst Haekel in 1870, he wrote, "By ecology…we mean the body of knowledge concerning the *economy of nature…*ecology is the study of all the complex interrelations referred to by Darwin as the conditions of the struggle for existence" (as quoted in Ricklefs, 1990, p. 1, emphasis added). Such close intermingling of wording and concepts points to a necessary, direct correlation between ecology and economy. In order to *manage* the household effectively, one must first *study* the household and understand its

multifarious dynamic interrelationships. Most importantly, this suggests that economy is rightly a *subset* of ecology, since the human economy is a subset of the economy of Nature. Other words with an *oikos* root are ecosystem, ecotone, ecovillage, eco-feminism, and eco-consciousness – all refer to an intimate, biogeographical, community-oriented, *place*-based understanding.

Then what has happened to economy? Elucidation of the transition can be gained by glancing into a typical economics textbook. From the very first paragraph we are informed:

> Human beings, unfortunate creatures, are plagued with wants. They want, among other things, love, social recognition, and the material necessities and comforts of life. People's striving to improve their well-being, to "make a living", is the concern of economics. More specifically, economics is the study of people's behavior in producing, distributing, and consuming the material goods and services they want in a world of scarce resources…*Economics is concerned with the efficient utilization or management of limited productive resources for the purpose of attaining the maximum satisfaction of human material wants* (McConnell and Pope, 1987, p. 3, emphasis added)**.**

This modern, behavioral science type of definition for economics certainly has diverged from its original intention. What is telling is the shift of focus of the very value structure upon which it is based. Lost is the community-oriented, place-based process of interrelationship that defines the rest of the *oikos* words. What is left amounts to a cynically proposed priority of human nature to strive for the maximization of material wants in a world of projected scarcity.

A passage from the first chapter of another introductory text amplifies the shift:

> During its approximately 200-year history, economics has evolved into two major sub-disciplines: microeconomics and macroeconomics. As its name implies, microeconomics is concerned mainly with small segments of the total economy – individual consumers and producers that are known as markets or industries. The subject matter of microeconomics deals in part with allocating resources to their most valuable uses so as to maximize the total output of the economy… Macroeconomics…is concerned mainly with economic aggregates, or the economy as a whole…both micro- and macroeconomics deal with the size of society's output of goods and services and the distribution of this output (Peterson, 1989, pp. 3-4).

Here we come face-to-face with the vague, abstract, strictly utilitarian kind of reasoning that fills the airwaves and newsprint, and comprises the basis of the current version of economic thinking. What is "the economy as a whole?" What is implied by maximizing

its total output? What does it mean to symbolize people as "individual consumers" or, in the aggregate, "markets?" Who is most concerned with the size of "society's output?" This author gives a strong clue to the answers to all these questions by stating that economics is just *200 years old*! In the next section he reveals the underlying dynamics:

> In view of the importance of government in the study of macroeconomics, we should not be surprised to learn that politics and economics are closely related. Indeed, economics has been called the study of political economy. This was especially true during the 19th century. With the passage of time, political science and economics gradually emerged as separate, although closely related, disciplines (ibid).

This, then, is the answer: What has come to commonly be known as 'economics' is really just a junior partner of politics; it has little to do anymore with effectively managing the immediate community "so as to increase its use value to all members." The difference seems to come down to a matter of scale. Economics has devolved into political strategies deciding who will have access to the most resources. It has become a public policy tool whose purpose is to concentrate and consolidate wealth and power into fewer and fewer hands. Its primary concern, as theoretically proposed, is to maximize throughput of natural resources through industry so as to maximize total output – but that too has devolved into only part of the story.

Economic thinkers have been motivated by a desire to isolate the 'economic' as a distinct focus of human experience, segregating it from its interrelated community and overarching ecology, ostensibly turning it into a separate new 'science.' All the sciences, until recently, have sought to model themselves upon the empirical exactitude, rational objectivity, and mechanistic, reductionistic objectives of Newtonian physics. Thus, what has emerged as modern 'economics' is essentially an abstract, mathematically languaged *pseudo*-science, replete with formulas and statistics, charts and graphs for measuring, quantifying, objectifying, and projecting all sorts of indicators – except actual quality of life. The scientific economics that has resulted objectifies, mechanizes, and reduces individual persons down to so many units of consumers, human resources, or labor, and objectifies, mechanizes, and reduces the living world down to so many units of materials, products, or natural resources to be consumed. In its prime directive to "maximize the total output," economics blindly ignores the realities of the limitations of a finite Earth, the living Nature from which it ultimately draws its sustenance.

How, then, are we to conceive and formulate an *ecovillage* economics? The subject matter of pure, genuine, unadulterated economics is serious business, intimately involved with daily living; indeed, it is the very process by which Life sustains *itself.* Before laying down fundamental principles, it will be useful and illuminating to digress a bit and analyze the situation at the dawn of modern so-called economics.

The Marketplace

Synchronistically, Adam Smith released *The Wealth of Nations* in 1776, coinciding with the birth of the United States (and just five years prior to the discovery of Uranus, a planet associated with freedom, individualism, and electricity/eccentricity). Europe was in the beginning stages of the Industrial Revolution. Spurred by recent innovations in the mechanization and standardization of the manufacturing process, and fueled by the recent harnessing of extended available energy made possible by the invention of the coal-fired steam engine, "captains of industry" found themselves able to produce material goods at a rate that far exceeded the capabilities of "cottage industry" – and this rate grew exponentially with each new passing invention and innovation. For example, "In just fifty-one years, English textile production increased 120 times over" (Hawkens, Lovins, and Lovins, 1999, p. 170). The awesome new potential that was unleashed to not only satisfy but satiate the material necessities of life, and the concomitant generation of enormous amounts of material wealth, sparked a fundamental paradigm shift that reverberated throughout the globe. As during any revolution or paradigm shift, new philosophies were expounded to guide the shift and provide context (Kuhn, 1970).

In *The Wealth of Nations,* Adam Smith proposed that the most effective way to manage the newly created productivity and wealth was to give free-reign to the mechanisms of what he called "the marketplace." His argument was that free individuals competitively acting in their own best self-interest, as honest, well-intentioned business owners providing use-value to a community, would benefit society at large. Further, "the enterprise of individuals was capable, when left free of regulation, of carrying the standard of material well being to heights hitherto impossible" (Skinner in Smith 1776/1970, p. 11). But Smith was a pious man, and by his own standards his most important work was *A Theory of Moral Sentiments.* In the first sentence of this philosophical treatise, he tempered and qualified the self-interested individuality focus by explaining, "How selfish soever man may be supposed, there are evidently some principles in his nature which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it" (ibid, p. 17). Smith believed that only individual self-restraint, motivated by faith in a higher power and purpose, could guarantee social stability.

By this account, Smith's marketplace economic theory was in every way 'whole systems' thinking, relying on the self-organization and self-regulation of the integrated whole of a multitude of uncoordinated individual choices to produce a desired outcome – much as the independent productivity of a multitude of individual cells contributes to the self-organization and self-regulation of an individual body. And, I might add, his theory was not that remarkable either: Witness any traditional village or pre-industrial culture: the vibrant center of economic activity is "the marketplace." Smith's philosophy was conterminously contrasted by Marxist philosophy, which sought to organize and regulate the newfound productivity under a centrally planned, hierarchical authority, theoretically placing the "tools of production" in the hands of the people. Piercing through the veiled demagoguery of neoclassical economic rhetoric, and analyzing it for what it is, macroeconomics is every bit as centrally planned and hierarchical as the Marxist proposal; the difference is in who owns the tools of production.[1]

Adam Smith is often erroneously, even patronizingly, called "the father of capitalism" – yet this is not the case, for, as a devout Scotsman he deplored large monopolies and was more concerned with the interests of small farmers, entrepreneurs, and community-based businesses. It seems that the large landowners and estate barons of his day seized upon his ennobling of individual self-interest to rigorously advance their own political self-interest at everyone else's expense. As Europe was emerging from a feudal system into this new, as yet unrealized industrial system, those individuals with 'capital' (i.e. private property that could return investment income) to finance new industrial enterprises held political leverage against the central authority, the king, so influencing public policy decisions to their own advantage, thus increasing their stake. They selectively chose passages of *The Wealth of Nations* to justify their striving for individual, unrestrained accumulation of wealth, power, and privilege, much as the natural selection theories of Darwin, a century later, were selectively chosen to justify domination and colonialism under the pretense of "survival of the fittest." The fact is, "the term *capitalism* never appears in *The Wealth of Nations…*and didn't come into common usage until the early 1900s" (Korten, 1999, p. 152). Further, "There is…only one passing mention of the invisible hand in the entire nine-hundred page text" (ibid, p. 154).

The point is, there is as much a sharp distinction – even a contradiction – between 'market theory' and 'capitalism' as there is between 'economics' and 'finance:'

[1] The current economic system is full of quotas and subsidies, laws, regulations and inequities that stifle the self-organization and self-regulation of the marketplace, and are in every case planned from a central authority: government and the Federal Reserve. All the high-stake financiers and industrialists who met at Jeckyll Island, South Carolina to give birth to the Federal Reserve made a pact to cooperate because outright competition in a "free marketplace" was too costly to them. For full details, see Mullins, 1983, *The Secrets of the Federal Reserve*.

> Since the time of Adam Smith, market theory has been quite explicit that the efficiency of the market's self-organizing dynamic is a consequence of small, locally-owned enterprises competing in local markets on the basis of price, quality, and service in response to customer-defined needs and values. No buyer or seller may be large enough to influence the market price individually (Korten, 1999, p. 40).

What we have come to know as the "global capitalist economy," with its emphasis on the so-called "global marketplace," is nothing but the institutionalized privilege of "a few financial speculators and a handful of globe-spanning mega-corporations" (ibid) to predatorily control the world's resources. It is not 'economics' at all but rather greedy global finance. It has little to do anymore with 'market theory' but is instead simply unrestrained hedonistic capitalism – that is, maximizing financial return for those few individuals who have the 'capital' to invest in the tools of production. Under this neo-capitalist system, wads of new billionaires emerge every year while whole communities disintegrate; individual CEOs covet huge financial paybacks in the hundreds of millions of dollars while whole factories of workers are laid off in acts of "downsizing." There never was a "level playing field," and it is even less level today. The new bottom line is: maximize short-term financial gain to speculators, shareholders, and investors so they can increase their concentrations of power and privilege – and that, it's very important to point out, is very *un*economical in the long run.

"In *The Wealth of Nations,* Smith attempted to explain the *modus operandi* of a type of economy which corresponds to the 'commercial' stage of the theory of history" (Skinner in Smith, 1776/1970, p. 31), where the stages of the evolution of society were understood as hunting, pasturing, farming, and commerce. Smith surely could not have anticipated the emergence of an "information economy," much less an "economy of light" in Hazel Henderson's (1988) terminology. Still, it may be proposed, his theory of the dynamics of the marketplace remains valid at any level of cultural evolution because it is based on timeless, organic principles. The 'marketplace,' as originally envisioned – and as universally practiced by traditional, pre-industrial cultures – mimics natural living systems in that it is self-organizing, self-regulating, and self-correcting. It is 'holarchical' in outlook in that each holon – whether the individual, the family, the community, the bioregional society, or the Earth itself – benefits and contributes to the well-being of the whole systems of which it is a part and to those which it contains, simply by maintaining its own best self-interest, which is maintaining its own optimal health. The marketplace is 'economy subsumed under ecology,' resembling a healthy ecosystem in its function. At its best, the market is a network of decentralized, human-scale, locally owned businesses, services, and industries whose goal is to provide maximum use-value to all

concerned. This is economics in the original sense of “managing the household,” and, in the interest of Smithian values, could be considered very pious.

Ayn Rand wrote an interesting book called *Capitalism: The Unknown Ideal,* in which she glorified the brilliance and virtues of the industrialists, who by their brains and toil were able to rapidly modernize and develop the world, supposedly benefiting everybody and everything in the process. We may equally call for a proposed book *The Marketplace: The Unknown Ideal,* for market theory has been only marginally institutionalized. Adam Smith wrote in a different age, yet *The Wealth of Nations* is still worth a careful read. The inherent democracy of the Information Age, coupled with a growing eco-consciousness across the globe, may very well reverse the trend toward the ever-increasing centralization of arbitrary power as epitomized by global capitalism, spiraling the movement back toward more decentralized, human-scale, community-based ventures, where genuine market theory could be a useful comprehension and implementation tool.

The Illusion of the Global Economy

Neoclassical economic theory states quite explicitly that its goal is to "maximize the total output of the economy." Yet, we may rightfully ask, "What exactly is being maximized?" In a simpler, more transitional industrial era, when resources were plentiful and people relatively scarce, the well-intentioned goal may have been to maximize the total output of goods and services so as to enhance the quality of life. But we are currently living in an electronic, computerized, Information Age where people are now plentiful and resources relatively scarce. Maximizing material flows as a strategy is extremely wasteful, very uneconomical, and hardly even possible anymore. Ideally, what would be maximized is 'quality of life' as an indicator of its own; but that is very difficult to quantify and fit into formulas and statistics, so economists tend to ignore it. Unintentionally, outside the sphere of macroeconomic planning, 'information' is now being maximized, and, theoretically, information can be equated with money.

The growth of this 'thing,' the economy, is measured primarily by gross domestic product (GDP), or the total amount of money that has changed hands. By reliance on this indicator, ludicrously, traffic accidents and AIDS vaccines, oil spills and clear-cuts all contribute to the growth of the economy because more money has changed hands – though actual quality of life surely has diminished. Under this myopic focus on money, the production of worthwhile goods and services can actually decline while the economy is reported as expanding, and this is exactly the case in the United States today. Economist and futurist Hazel Henderson (1991, p. 154) describes the situation lucidly:

> …money is fast losing all meaning as a measuring system for real world production and value. Manipulated by politicians and central banks, and now speeded up by electronic funds transfers in a multinational banking system and abstracted by global, 24-hour asset management, money bears little relationship to reality. Smart investors everywhere know that it is easiest to "make" money by speculating, arbitraging currency, playing interest rate differentials and other forms of paper entrepreneurship than to invest in a real factory employing real workers and producing real products in the real world.

She goes on to speak about standard economic indicators, like GDP:

> …all are loaded with biases and ignore structural issues of power and prior distribution of wealth and foster an unrealistic view which equates real wealth (natural resources and the skills, specific cultural assets, local conditions and creativity of resourceful human beings) with mere money (p. 163).

She subtitles her book from which these quotes were taken "Life Beyond Economics," convinced that what passes for economics today is so far divorced from the real concerns of real people that it is no longer worth pursuing as a discipline, and ought to be scrapped.

But so many of the world's big players are benefiting by the continued charade that 'economics,' while remaining inscrutable, continues to broadcast an illusion of respectability and substantiality. Henderson's book came out in 1991 and accurately portrayed the state of affairs at the time. The situation actually has worsened since then with the "global capitalist economy" becoming further entrenched. The disparity between mere money and actual wealth – as the disparity between rich and poor – has grown in stride with the advance of this New World Order. Some of the activities that are accelerating under the guise of economics are shocking. Money theorist Bernard Lietaer, former director of the Belgian Central Bank and conceptualizer of the Euro, describes the trend:

> In 1975, about 80% of foreign exchange transactions (where one national currency is exchanged for another) were to conduct business in the real economy…Real transactions actually produce goods or services. Today, the real economy in foreign trade transactions is down to 2.5% and 97.5% is now speculative…The real economy has become just a small [minute] percentage of total financial currency activity…In 1997 about $2 trillion in currencies were being traded per day. This is equivalent to the entire annual…GDP volume of the United States being turned over via currency trading every three days (1998, p. 4).

Welcome to the Global Casino! Money, the intended *medium* of exchange, has become the exchange itself; money, the intended *representation* of wealth, has become the wealth itself. The "free floating" impalpable abstraction called the "global economy" is so far removed from the realities of quotidian earthly existence that it threatens to evaporate into thin air – there is nothing tangible or substantial about it – it is not the least bit 'economical.'

Even though the evanescent speculative nature of the "global capitalist economy" will prove to be a temporary joy ride, leaving behind a legacy of upsetting global stability and harming many living things in the process, it is, ironically, producing a wide range of effects which could be considered promising when looked at from a

long-term perspective. For the very reason that so much money-power is being hoarded at the top, local communities are beginning to come back to life and mobilize; the plutocracy may have over-extended themselves this time. Whether through local political citizen's initiatives or outright civil unrest (as against the World Trade Organization (WTO) in Seattle, November 1999, or against the IMF in Philadelphia, April 2000, or against the Democratic National Convention in L.A., August 2000, or at the many largely unpublicized similar incidents around the globe) the people are speaking out loudly and reminding us that true wealth and power originate at the grassroots base. Corporate down-sizing and the transfer of jobs overseas is restructuring the entire economy: as whole communities are being displaced and dispossessed, people are taking matters into their own hands by forming cooperatives, going into business for themselves, sharing and bartering more, and even creating local community currencies to augment scarce national currencies (according to Jackson (2000, p. 37), 2000 such systems have been initiated as of this writing). The ultimate solution, incorporating all the above strategies and more, is the full-featured 'ecovillage.'

In the new global climate, corporations are finding it advantageous to decentralize their production and marketing sectors, even as they centralize their financial and treasury sectors (Lietaer, 1998, p. 5). This is so because the volatility of national currencies means that it is best to spread out operations and not have everything in one location that could be hit hard by the rapid devaluation of a particular currency. Corporations are discovering that "adaptation to local circumstances can best be handled on a local level" (ibid). While much of this decentralization is sending production facilities overseas, meaning lost jobs in the short run, there are hidden opportunities for communities to increase their self-reliance over the long haul. The overall trend in manufacturing is toward compact, high-tech, energy-efficient facilities that are more profitable because they cut overhead, transportation, energy, and distribution costs. The overall trend in business anyway is away from producing goods toward producing services and managing information. Local communities stand to benefit from these changes, especially if they are able to self-organize into authentic communities with a common interest and shared sense of destiny. Remember, the real wealth of a community is its skills and knowledge, solidarity, creative productivity and cultural assets conjoined to a healthy, productive local ecology. With so much of this kind of wealth readily available, local communities should be able to weather any kind of change, and should be able to organize their own socio-economic structures – even to the point of managing world-class industries and manufacturing processes, as has been demonstrated at Mondragon in the Basque country (see Whyte, 1994).

Another shift occurring as a result of the expansion of the "global capitalist economy" that has promising long-term effects is the erosion of power of the 'nation-

state.' "Currency traders are effectively "policing" governments by selling off a nation's currency when they are dissatisfied with that government's policies" (Lietaer, 1998, p. 5). The governments of nation-states have been unable to counter this subversion of their sovereignty. They have been forced to go along and adhere to the austere restructuring policies of the IMF, or open up their borders to trans-nationals and lose their "comparative advantage" through GATT.[2] The most heinous example of the loss of sovereignty is the nullification of internal domestic laws by the arbitration of a few individuals of the WTO, the ultimate in un-democracy. Any national government that seeks to protect internal resources, populations, or markets restricts the flow of free-floating money-capital, and so is targeted by the international monetary institutions into submission.

While in the short run these actions cause immeasurable hardship and critical environmental degradation, in the long run they will have the consequence of uniting the people of the world against both the nation-states *and* the New World Order. The nation-state is an outmoded form of organization, often an artificial imposition upon the natural, bioregional organization of the land. For example, the colonial British drew up the national borders of the Middle East and West Africa to purposely promote divisiveness among the population, cutting across traditional ethnic boundaries so they could maintain administrative dominance. How about the arbitrary, ecologically insensitive border between the United States and Canada, drawn up by Emperor William I of Germany in 1846 to mediate a dispute in international court, though he had never actually seen the place? The US itself, with its great diversity of biogeographical subcultures that cut across arbitrary state boundaries, is far too large and complex to be managed from a single authority. Perhaps it would be best to subdivide the United States and reorganize along more economically sensible bioregional boundaries? How about the former Yugoslavia and USSR, both examples of forceful impositions that dissolved under the weight of their energetically wasteful exertions.

Have the governments of the nation-states ever held the well-being of their own citizens as the highest priority? Or have they sought to maximize their power as entities in their own right, in competition with other nation-states in that anarchic global game called 'civilization?' Many wars are fought to maintain these arbitrary borders; the rest of the wars are fought to ensure nation-states' access to resources and markets beyond their borders. The demise of the nation-state will ultimately be a benefit for the biosphere.

[2] "Comparative advantage" is David Ricardo's term for describing how specialization and trade can be beneficial to areas or nations because of special advantages in the production of certain goods or services. These advantages may stem from climatic conditions, natural resource endowments, human skills, etc.

The solution to all these threats to democracy, intergenerational equity, environmental degradation, and economic self-determination is the same: organization at the community level. Really get to know your neighbors and make sure things are right between you. Look closely at your immediate family and make sure there are no unspoken resentments. Inventory your community's wealth – the skills and knowledge, talents and creativity, and cultural assets of the people, including the natural capital that sustains them – and invest in that wealth, over and over again. Make sure that no wealth is leaking out to the speculative global economy. Network with similar communities throughout the area and across the globe and find alliances and common ground. Commit to living in your home place for generations to come. Once you've adopted these attitudes and practices, then an ecovillage will have the chance to grow around you.

We are living in an exciting time, for the world is transforming rapidly before our very eyes. Rapid change can appear chaotic, and can be extremely uncomfortable and unsettling for those who are living through it. Yet, we are told, the Chinese character for 'change' can also be interpreted as 'opportunity.' Chaos Theory teaches that during a time of wild disequilibrium, systems often spontaneously leap to a higher, more refined and inclusive order. Indeed, thermodynamic equilibrium is nothing more than death. Clinging to the outworn, decaying remnants of a previous time may offer temporary security, but can only make the transition more difficult. Standard economic thinking, for the most part, is still clinging to the same old formulas, theories, indicators, statistics and methods to measure and maximize the output of an 'economy' that is rapidly fading into an imagined relic of the past.

The lineages of those large landowners and estate barons who, at the outset of the Industrial Revolution, manipulated public policy to increase their own holdings without restraint, on the backs of others' labor, now hoard a perverse share of the world's money. Others who have been willing and successful at jumping into the power manipulation game have joined their ranks, and together they make a serious effort to control the world's total resources – natural capital, human capital, social or cultural capital, *and* financial capital – to ignominiously advance their own material affluence and influence at the expense of the rest of the living world. (I read somewhere that there is enough money-wealth on the planet for every single family to own $10,000,000 – or was it every single person?).[3]

[3] If I had my $10,000,000 I'd begin right away establishing a first-class ecovillage! Why aren't the billionaires of the world thinking of this? Why do they choose to hoard their money instead, or frivol it away on ostentatious luxury? What dim consciousness!

I think that the "global capitalist economy," driven by its crude, shallow underlying values and motivations, is just the inevitable outcome of the 5200-year march of civilization. Years ago, as population pressure forced people to establish and live in cities, an idle 'ruling class' was formed (or formed itself). The power struggles that inevitably ensued between the 'rulers' of these growing proto-cities, competing for control of the wealth of ever scarcer resources, selected for personality traits that were ready and willing to wield arbitrary power and take by force or coercion, knowing full well that others would be harmed in the process. This is the essence of civilization: the concentration and consolidation of arbitrary power (like money) into fewer and fewer hands.[4] The city-states grew into nation-states and now the nation-states themselves have been eclipsed by the New World Order, embodied in such international monetary entities as the WTO. The context has changed but the game has remained the same, and those who feverishly play seem to be trying to substitute money for real meaning. These perpetrators seem to be unconscious of, or at least disregard, the consequences of their harmful actions.

"Life beyond Economics" will surely be "Life after Capitalism,"[5] and, we can be assured, the fundamental transformation of what we have come to know as civilization. There is simply no other choice. Nature is providing feedback from every quarter that human beings have overstepped their boundaries. Fueled by the aspirations of industrial capitalist economics, the human machine is now in the process of reversing four billion years of evolution. The climate is changing, deserts are expanding, topsoil and aquifers are being lost, genetic and cultural diversity is being trashed to support quarterly growth earnings and stock market gains for 'investors,' etc.

We are truly at "The Turning Point."[6] A new paradigm is emerging, one based on eco-consciousness – a true understanding of how to "manage the household." In this regard, the conceptual tools informing the new economics that will accommodate this new paradigm are: biology, ecology, and systems thinking. The new consciousness seeks to mimic Nature in all its activities in order to foster 'sustainability' – that is, inter-generational and inter-species equity and justice. It is an evolution from *ego*centric and anthropocentric to *eco*centric and biocentric motivations. The new consciousness understands that devoting attention to the whole and ensuring the health of the whole automatically empowers and supports each part of the whole. Ecoconsciousness is the next stage of human evolution.

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[4] For an impressive scholarly treatise on this phenomenon of civilization, see Andrew Bard Schmookler's (1984) *The Parable of the Tribes: The Problem of Power in Social Evolution.*

[5] "Life after Capitalism" is the subtitle of David Korten's important book *The Post-Corporate World* (1999).

[6] "The Turning Point" is the title of Fritjof Capra's (1982) book describing the paradigm shift in terms of systems languaging.

The ultimate purpose of the economic process is the maintenance and enjoyment of life. Through this process, human beings convert the natural capital of the Earth into products that are necessary, useful, and/or beautiful by applying energy, knowledge, and culture. The value system that is the foundation of any particular economic process must ultimately be judged by whether it is promoting and advancing the above ends – is the maintenance and enjoyment of life being *optimized*?

As has been shown, the neoclassical economics that evolved into the "global capitalist economy" sought to make a science of itself, modeled upon the rational objectivity – and thus value-free neutrality – of classical physics. Its underlying and unexamined assumption was that the more material affluence people had – that is, the more they could self-indulgingly consume – the happier they would be. And so all the theories, principles, and policy directives of this economic process had one goal: *maximize* throughput of materials through industry to *maximize* production so as to *maximize* consumption – then everybody would be happy, and social well-being would be assured.

Besides being unconscionably wasteful, this pseudo-scientific thinking has one glaring oversight: the entire economic process is taking place within a *materially closed system*. The faster that natural resources and raw materials are extracted and consumed, the faster they are depleted. As high quality stocks of natural materials are rapidly converted into so many widgets and gadgets, more and more energy must be applied to access and transform the lesser-quality remaining stocks. Compounding this dilemma, the insatiable desire to satisfy never-ending material wants stimulates the creation of ever-newer wants, and so the *rate* of consumption must continually increase, irregardless of population growth; thus, the so-called economy must consistently grow forever. (If it didn't, institutions that make their money off interest, like banks, would go out of business.) Besides being scientifically unsound, neoclassical economics is ethically bankrupt.

Standard economic thinking is now running head-on into environmental limits and biophysical realities. The reality is, the Earth is a living system: it is materially closed

yet energetically and informationally open. It maintains its living status by constantly recycling its materials and continually absorbing free energy from the Sun, and then banking that energy through photosynthesis into accumulated biomass.[7] As a living system, using this fundamental life-process of self-regulation, or homeostasis, the Earth is able to sustain itself in a state of open dynamic equilibrium, releasing and offering its stored energy-potential as needed to maintain the quality of life of its multitude of living subsystems – including ecosystems, communities, families, and individual organisms. Thus, the life-process is continually renewed. This is the economy of Nature. By *this* economic process, trillions and trillions of individual organisms are able to maintain and enjoy life; so its value system is sound.

A more thorough analysis might look something like this: "Terrestrial energy in any form ultimately originates from the Sun. Plants, as primary producers, collect this energy and utilize it in their metabolism, photosynthesis, creating sugars and expelling degraded energy. Humans and other heterotrophs then absorb plants for their own metabolism, and in turn expel degraded energy into the environment as waste material that can be utilized by bacteria and other decomposers. The bacteria and decomposers then convert this waste material back into a form that can be utilized by plants, and the process repeats itself. The original pure solar input is eventually lost, however, and the plants need a continual flow of incoming solar energy to keep the whole process alive. This is a simplified version of the primary energy cycle of Life on Earth; it all begins with the Sun. The continual, inevitable degradation of incoming solar energy to less usable forms is termed "entropy." (Entropy is actually more conceptually complex, but for this discussion that definition will do). A viable economy – which ultimately means the process by which life sustains itself – will be modeled upon this primary energy cycle. Its goal will be to arrest the flow of entropy and enhance the utility of the solar input at each stage" (Mare, 1998, p. 7). These are the fundamentals of the economy of Nature. The human economy, as a subsystem of the economy of Nature, must come to terms with these realities if it ever hopes to become sustainable; after all, this process has produced continuous abundance and diversity for almost four billion years – what could be more sustainable?

The word 'sustainability' is thrown around a lot these days, often meaning different things to different people. One simple and elegant definition goes something like this: "An activity is sustainable if its current operation satisfies the needs of the present generation without diminishing the opportunities of future generations" – in other words, "it can be continued into the indefinite future." Operating under a value

[7] The fraction of total solar radiation that's intercepted by the Earth's disc is 3x10 to the negative 10^{th} – yet that still amounts to about 2x10 to the 17^{th} watts, or nearly a fifth of a quadrillion watts (as explained in Hawken, et al., 1999, p. 342).

system like this, a truly sustainable economy would seek to *preserve* natural capital and *enhance* the productivity of natural ecosystems. It would be designed to operate within and energetically optimize biophysical restraints.

Standard economic accounting, with the abstract exchange medium of money as its singular variable, makes no provision for the loss of the stock of natural capital or the decline of the productivity of natural ecosystems; it simply regards the Earth's resources as free for the taking, to be exploited at will. Accordingly, "by depleting high quality resources, advanced industrial production undercuts its own productivity" (Krishnan, et al., 1995, p. 28), and places its continued existence on a decelerating timeline – it is not the least bit sustainable. Naturally productive ecosystems perform services worth trillions of dollars. These "ecosystem services" are part of the healthy economy of Nature, and include such vital processes as: flood control by forested hillsides, water purification by healthy estuarine systems, carbon sequestration out of the air and into biomass, atmospheric regulation and homeostasis, the building of topsoil, etc. Neglecting these services in standard economic accounting leads directly to pernicious environmental degradation. Economists call the consequences of environmental degradation – that is, "the social cost of a polluted environment, disrupted communities, disrupted family life, and eroded primary relationships" (Henderson, 1988, p. 12) – "externalities." There is no way to place a monetary value on them so they are systematically disregarded in production statistics, even as their costs are blindly added to the GDP as "income:"

> The "environment" area within the existing discipline of economics is too constrained by its requirement of market valuation to respond adequately to the complexities of issues such as global warming, species loss, ecosystem degradation, inter-generational equity, and non-human values. Ecological economics by contrast, starts from a recognition of the biophysical realities underlying the operations of the economic system (Krishnan, et al., 1995, p. xxxv).

The first and foremost biophysical reality is that the Sun is the source of all energetic processes on Earth. Ecological economics, then, uses an *energy* accounting system to measure the efficiency and productivity of the economic process, much as the science of ecology uses 'energetics' as a measure of the efficiency and productivity of an ecosystem. Under an energy accounting system, "economic value is proportional to energy content" (ibid, p. 141) and "throughput might be measured as embodied energy" (ibid, p. 121); available energy is put to its most efficient, productive thermodynamic use. "Economies, like organisms, are open systems, resisting entropic decay by importing low-entropy matter-energy from the environment and exporting high-entropy matter-energy" (ibid, p. 193). High-entropy is disorderly waste; low-

entropy is highly organized energy beginning with the pure solar input, which is then degraded at each successive step of the economic or metabolic process, losing thermodynamic potential along the way until it is eventually completely dissipated. Since the solar budget is fixed, real efficiency and productivity begins with *maximizing the utility of the solar input at each step along its path of entropic decay*:

> Thermodynamic potential is a fundamental measure of a system's capacity to perform work. The science of thermodynamics enables us to determine the maximum expenditure of thermodynamic potential to achieve a given physical change. Since every process requires the consumption of some thermodynamic potential, we are able to compare different processes and select that which is most thermodynamically efficient. The change in thermodynamic potential associated with a process will measure all of the energy exchanged as well as the effects upon the degree of disorder or dilution, i.e., the entropy of the system (ibid, p. 194).

By these criteria, the standard economic process is energetically defunct, for by its insistence on maximizing the throughput of high-grade materials to maximize consumption, it is *accelerating* the rate of entropic degradation and squandering the store of low-entropy, high-order materials, ecosystems and ecosystem services that the Earth has been stocking for billions of years. (And to think the finished products of this wasteful system end up in high-entropy, low-order landfills!) Standard industrial processes are also extremely thermodynamically inefficient, using energy to produce heat, "which in turn is used to perform work, rather than converting energy resources directly to work" (ibid, p. 144) The thermodynamic potential of the dissipated heat is lost forever.

The "global capitalist economy," a gluttony of energy waste, is the ultimate in thermodynamic inefficiency. Consider the "ecological footprint"[8] of a typical can of soda (as detailed by Hawken, et al., 1999, pp. 49-50): Bauxite ore is mined in Australia then shipped to the Pacific Northwest of America. There it is heated to thousands of degrees Fahrenheit for hours to convert the ore into aluminum. The aluminum is rolled into sheets then transported to another location to be punched and fired into cans. The cans are then labeled and trucked to distributors all over the continent where they are filled with carbonated sugar-water. The finished cans of soda are then re-distributed to regional stores and markets where the 'consumer' can finally make a purchase. The consumer may say, "All I wanted is to quench my thirst" – yet in the process of spending money has unwittingly participated in the expenditure of enormous, astronomically

[8] For this important concept, which also may be applied to cities, see Rees and Wakernagel, 1996.

disproportional amounts of energy to satisfy that want. The money-based economic system is full of such absurdities.

Consider that industrial agriculture uses *ten* calories of fossil fuel energy to produce each *one* calorie of food energy, compared to a hunter-gatherer system which would expend one calorie of body energy to obtain up to five calories of food energy. Or consider the ubiquitous contemporary automobile, around which the North American built environment and lifestyle have been constructed: "Of the energy in the fuel it consumes, at least 80 percent is lost, mainly in the engine's heat and exhaust, so that at most only 20 percent is actually used to turn the wheels" (Hawken, et al., p. 24).

These are just a few examples to demonstrate how profligately, energetically inexcusably, wasteful is "the economy" of which our politicians and media speak. What justification is there at all for *expanding* this economy when the same level of affluence could be achieved by *reducing* it? Reducing doesn't mean simply recycling: it means effectively cutting energy consumption in the ten-folds by intelligently introducing the productivity and efficiency of an energy accounting system based on the principles of ecological economics.

What will an ecologically organized human economy look, feel, taste, sound, and smell like? For one thing, it will be broadly decentralized: "There is an enormous disproportionality between the flow of solar energy and the much more limited stock of terrestrial fuel energy" (Krishnan, et al., p. 183). Harnessing the pure, high-grade, perennial low-entropy of the solar flux will provide free energy in such abundance that no centralized power could ever monopolize it. Combined with the efficiency revolution of an energetic accounting system, human social groups, including business and industry, will find that they are able to sustain high quality, energy abundant lives while organizing their needs locally, at a human scale.

For another thing, it will be an economy – and an entire socio-economic structure – based on light. To the physicist, light is information. Information is order. Order is negentropy. Negentropy is the very quality of the initial pure solar input – light. (Information – order – negentropy – light = currency?) The ever-growing interchangeability between information and money is already furthering the movement toward decentralization, as knowledge and information become a form of *intellectual* capital that is non-localized and able to network anywhere.

It also will be an economy continuing to grow in *quality* while forever reducing *quantity*. A competitive race will ensue to see who can produce the most *value* with the *least* amount of throughput of materials. This is already beginning to happen, simply because business has discovered that it is *profitable.* Hawken and the Lovins's devote a

large portion of the book *Natural Capitalism* to describing in detail the improvements that can be made by adopting a strategy of "radical resource productivity." Businesses that have instituted this method have found their profits soaring, while those who lag behind in the old, wasteful, maximize-throughput way become increasingly uncompetitive.

Under an ecologically organized economic process, natural capital will not only be conserved, there will be a movement to *enhance* its value wherever possible. The value of an ecological system will be gauged by net primary production (NPP), an indicator of how much carbon is being stored in biomass, not the short-term monetary-value to be gained by exploitation. After all, the new game is: optimizing the store of embodied energy so the biosphere as a whole has a chance to experience affluence. David Korten (1999, p. 133) has called the capitalist economy "centrally planned and managed by corporate institutions to profit from colonizing living systems and extracting their embodied energy reserves." The first lesson of ecology is: Everything is connected to everything else. Once this fundamental principle is understood, the next step is to realize that by promoting and ensuring the health and welfare of the whole, each member of the whole is benefitted and so enriched. This ecological wisdom strongly contradicts the actions of the global capitalist economy, where the health and welfare of the whole is sacrificed to benefit and enrich only a few of its members. Considering the health and welfare of the whole is the beginning of *eco*consciousness: when *Homo sapiens* makes this paradigm shift in great numbers, there will be a surge of investment in human, cultural, intellectual, *and* natural capital.

The new economy will be a shift of direction toward what Bernard Lietaer calls a "yin" economy (as explained in Jackson, 2000, p. 5). A yin economy is matrifocal (focused on the needs of the mothers); it is egalitarian, based on serving the interests of the local group; it encourages cooperation, decentralization, gifting, and long-term investment. Yin is "win-win." It is contrasted with a "yang" economy, which is patriarchal. A yang economy is centered upon the vigorous competition of individuals to create winners and losers. It is centralized, hierarchical, and focuses on short-term gain, ostentation, and accumulation that leads to scarcity. Lietaer argues that a healthy balance of yin and yang is best (for instance, 'yang' based on a centralized currency and 'yin' based on local, complementary currencies) – and any Taoist would agree. Yet the linear patriarchal economy has been dominating for so long, recklessly rushing forward, forgetting or unaware that all natural growth patterns exhibit cyclical periods of evolution followed by involution, that it may be necessary to emphasize the matrifocal (mothers and children), yin economy for awhile.

Ecovillage Economics

Ecovillage economics is ecological economics practiced at 'village scale.' There is no point speaking about an 'economy' without knowing at which scale it is operating. The scale is the specific spatio-temporal context within which a particular economic process: 1) identifies its values, 2) delineates its boundaries and so recognizes its limitations, 3) nurtures its center, 4) inventories its resources: natural, human, intellectual, cultural, *as well as* financial capital, 5) evaluates its "comparative advantage," and 6) defines its goals integrated within a prevailing socio-political agenda. The macroeconomic scale of the "global economy" is far too much an abstraction to adequately respond to the needs of individual persons; the economy of an individual person is too limited in potential to respond to cultural needs. Between these two extremes lay an economic scale that responds to the needs of individuals while also enjoying the emergent properties made possible by organizing collectively. This median point is the scale at which the ultimate goals of the economic process – maintaining and enjoying life – can be most readily optimized. This optimal median is 'village scale.'

Human settlements come in many sizes: camps, enclaves, hamlets, villages, towns, cities, metropolises, and megalopolises. The socio-economic climate is very different at each of these scales, affording its own set of opportunities and challenges. The actual population size will vary within each scale, depending on where it is located, the carrying capacity of its location, and the primary economic function from which it draws its sustenance – yet a particular socio-economic climate will be recognized as characteristic of each.

For example, the 'village' may contain from 500 to 5000 persons, while it has the unwavering socio-economic characteristics of: 1) everyone is known, maybe not intimately, but all faces can be recognized; there are no strangers; and 2) primary, secondary, and tertiary life-needs can be satisfied entirely within this socio-economic group. Primary life-needs can be identified as those required by a mobile, hunter-gatherer group. Secondary life-needs are those required by a sedentary, horticultural group. Tertiary life-needs become those that arise when a horticultural group complexifies enough to create a diversified, inter-specialized economy providing for the proto-civilization potentialities of art, religion, science and advanced technology, etc. Postulated quaternary life-needs could be characterized as those that manifest at the

'civilization' (city) phase, with many of these 'needs' being manufactured 'wants.' A village is also characterized by its essential integration within a specific ecology: the village is in alliance with its encompassing ecosystem; there is a relationship of reciprocity and mutual benefit with the living system of which it is a part.

A hamlet may contain from 50 to 500 persons. Social life is more intimately intertwined than in the village, but there are not enough people yet to produce all the goods and services that are required to maintain a complex, diversified, inter-specialized economy, and so some trade or barter is necessary with surrounding settlements in order to optimize life-potential. A hamlet is also, maybe more so, an outgrowth of a particular ecosystem: its very economic existence is made possible by the specific features and productivity of that ecosystem; there is very much a close connection and identification with a particular tract of land.

A town may contain from 5000 to 50,000 persons. At this level, the settlement has become so large that not everybody can be known. Factions will inevitably form in an 'us and anonymous them' mentality as power struggles develop concerning how to allocate ever-scarcer available resources, and for which economic purpose; more and more people are laying claim to a "commons." The situation is aggravated by the fact that a 'town' has begun to outgrow the carrying capacity of its local, encompassing ecosystem; its "ecological footprint" begins to extend beyond its actual boundaries.

A city may be from 50,000 on upwards to 5,000,000 (?) before it turns into a metropolis. At this scale, there are so many people that one continually encounters strangers just going about daily business. A mood of anxiety and distrust prevails since no one can be sure of the intentions of strangers, so people begin closing themselves off as a defense mechanism. The city's economic function has evolved into managing and expropriating the resources of an entire region. A hierarchical, bureaucratic, highly centralized power structure entrenches itself to direct and control the economic process and to skim off the wealth created by the labor of so many anonymous, faceless others. In its historical evolution, the city needed to extend and project its power in competition with other city-states to ensure access to distant markets and resources, so a standing army was required to enforce policy. At city-scale, the mutually beneficial relationship between a settlement and its local ecology has been completely lost. The city is a brute imposition upon a once living landscape, generally burying all traces of life beneath an abstract, artificed human construction.

Judging from this rough sketch of human settlement geography and associated economies of scale, it becomes apparent that there is a certain magic at 'village-scale.' This size offers the optimum synergy of complexity, productivity, efficiency, diversity, self-reliance, self-organization, personability, solidarity, manageability, and right-livelihood for all its members. Because of this high quality synergy, the village-scale

economic process provides the most complete opportunities for realizing its purpose: maintaining and enjoying life. Because of its fine working balance between human-scale possibilities *and* integration into a local ecology, the 'village' becomes the ultimate structural pattern around which to begin designing for sustainability.

There's already been plenty of theorizing done around this ideal settlement size. Alexander, et al., propose distinct communities of 7000 because at that size citizens can actualize direct participatory democracy (1977, pp. 70-72, Pattern 12). They go on to describe how each community of this size should be a distinct subculture with distinct physical boundaries so that the residents within can come to identify that place as their own (ibid, pp. 75-90, Patterns 13, 14, 15). Lewis Mumford reduces the ideal size to 5000, based on a life-long historical study of settlement patterns (1961, pp. 61-63). Kirkpatrick Sale calls this same 5000 "human-scale," and explains that light industry can be organized and managed with independent population groups of this size (1980, pp. 73-75). This was demonstrated by the Mondragon cooperative, the world's premier example of successful worker-owned cooperatives, which has been manufacturing high quality electrical appliances for the European market for some 40 years, and which first grew to about 5000, then clustered into subgroups of 300-500 to preserve individual identity (see Whyte, 1994). Bill Mollison also likes the "neighborly" size of 500, and demonstrates the advantages of confederating to alliances of 4000-7000 (1988, p. 523).

While seemingly abstract, the search for an ideal socio-economic settlement size carries a certain organic elegance with remnants of traditional practicality, for much of the research into these numbers was based on vernacular, pre-industrial settlement patterns. It seems that before the inundation of centralized, hierarchical, patriarchal authority and control, human settlements would generally grow to a certain optimal size before spontaneously cleaving into separate new settlements, much as the individual cell undergoes mitosis. This division was not enforced by mandate, but was simply understood to be the most effective way to ensure long-term quality of life for all concerned, including the encompassing ecosystem and all *its* living members. Before the growth in human population forced high concentrations of people to congregate in a single settlement, eventually giving rise to the city (and civilization), the cleaving off of a separate new settlement would entail relocation and establishment in a different biogeographical area. This move was an expression of the indigenous wisdom of generations not to upset the delicate balance between the settlement and the surrounding local ecology from which it drew its sustenance; thus it was inherently designed for sustainability.

These days, the human population has grown to fill every available spot on Earth, so there is no longer any possibility to expand and search for 'greener pastures' elsewhere; all available biogeographical areas are currently under stress. The move now

is one of implosion, filling in and overwhelming huge monstrous megacities and megalopolises, while the quality of life continues to deteriorate accordingly. How is it possible that the world population of humans could double to 12 billion by mid-century, without seriously disrupting ecosystem services and unraveling the Web of Life?

Theorizing about 'sustainability' means proffering solutions designed to continue the so-called "human experiment" indefinitely. The human experiment is not taking place in a vacuum; it is merely one cycle-phase in the fabulously divine interplay of even larger, ever more-inclusive living-system cycles culminating in the consciousness-focus of first a galactic and then a universal center. The most effective action humankind can undertake to ensure long-term viability into the indefinite future is to maintain and enhance the health and vitality of the immediate larger living meta-system of which it is a part: the living, evolving Earth – Gaia. To achieve this end, humanity must self-organize into organic subsystems that reflect and accentuate the living organization of the Earth, so that each subsystem may attend to the health and vitality of its immediately larger, encompassing ecosystem. At the individual settlement size, this means that human beings must learn to re-organize into ecologically integrated villages of no more than 5000 persons.

This is the potential of the 21st century "ecovillage" – to become an anthropo-socio-economic, biogeographical sustainable 'unit' of human settlement. Dense populations would do well to organically sub-organize into distinct, self-reliant, human-scale, sub-cultural, village-size clusters of around 5000. Each of these sustainable units of settlement could specialize in a particular economic function, depending upon its available resources, skills, wealth, and creativity. Each ecovillage would do its best to maintain and enhance the local ecology within its boundaries so as to foster sustainable self-reliance, and would strive to maintain and enhance cooperative, interdependent relationships with neighboring villages so as to foster sustainable economic inter-complexity. Large-scale industrial enterprises could then still be accomplished within an agglomeration of these village-scale unities. Using this egalitarian, highly decentralized pattern, there simply would be no need for arbitrary, centrally-managed hierarchical power structures – whether the government of a nation-state, an international monetary institution, or the board of directors of a trans-national corporation – to direct and control the economic process; each holon ecovillage can self-manage its own economic process much more efficiently and productively.

Within each sustainable, human-scale – one might say *tribal*-scale – socio-economic unit of 5000, specialization and diversification of tasks could be facilitated by further clustering into hamlet size groups of 300-500 each. The people in these neighborly groups would have an intimate economic stake in each other's lives, their relationships resembling extended families or clans – and this will be true 'social

security.' Each would have a representative at the civil government center of the larger village; and each would manage a more specialized sub-function within the greater economic function of the village as a whole. This arrangement could be envisioned metaphorically (and organically) as the various organelles of a eukaryotic cell manage specific sub-functions for the cell as a whole.

Those ecovillages not located in dense population centers, but rather in the surrounding countryside, have the opportunity to not only maintain their inner ecology, but also to enhance the ecology of the encompassing ecosystem of which they are a part. This is true only up to a certain point: perhaps for the remainder of this century much ecological restoration, reforestation, and general ecosystem repair will need to be accomplished; after that Nature can take care of herself. Still, the strategy will remain the same for any perennial ecovillage, no matter where it is located in time and space: to maintain highly productive, efficiently energy intensive, optimally diverse polycultural biological systems within and immediately surrounding its boundaries.

That is the foundation of any ecovillage economics – it is ultimately based on an ecological economic energy accounting system. By adopting this strategy, each ecological village will be able to sustain a high-quality life for all its members well into the indefinite future. This conclusion is not all that remarkable either, for traditional, pre-industrial, pre-civilized cultures practiced these principles universally.

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