



Eco-Link

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Eco-nomics

The world's economy is an open subsystem within a closed global ecosystem. The only thing getting into the ecosystem is sunlight, and the only thing escaping is waste heat. The economy continues to grow and develop. In an "empty world" it seems as if there are no boundaries, and wastes can be assimilated or recycled by the ecosystem. However, as we move toward a "full world" we become increasingly aware that the earth has finite space, resources, and carrying capacity. Therefore, the resources we use, and how we source, process and dispose of them, all become critically important issues. This presents a leadership opportunity to those industries producing renewable resources. In a "full world" the emphasis will be more on development, efficiency, quality, and sustainability, and less on how much mass and energy we can put through the system.

Population and per capita consumption are key issues as we develop a Full World strategy for living sustainably within the ecosystem. When Columbus sailed in 1492 the earth carried 300 million people, and now it is carrying 5.7 billion. This is projected to double in 70 years. Resource flows would increase seven fold if the earth's current residents consumed at the U.S. average. The world population doubled between 1950 and 1986, and the gross world product quadrupled in the same period.

Humans are part of nature, not separate from it. We are part of the "first nature" of the natural environment and part of the "second nature" of the built environment. Any definition of nature that excludes people and their work is indefensible, as is any definition of humanity that excludes nature.

We humans are interface between our "natural" environment and our built environment. Actually we live in both environments simultaneously. It is our ability to imagine, learn, and create that allows us to modify the natural environment and transform raw materials into useful products. Even in our built environments we are surrounded by natural resources albeit in a transformed state.

1. **Natural capital** consists of three major components:

- **Non-renewable resources** such as oil and minerals that are extracted from ecosystems
- **Renewable resources**, such as wood, fish, and drinking water that are produced and maintained by the processes and functions of ecosystems.
- **Environmental services**, such as the maintenance of the quality of the atmosphere, climate, operation of the hydrological cycle including flood controls and drinking water supply, waste assimilation, recycling of nutrients, generation of soils, pollination of crops, provision of food from the sea, and the maintenance of a vast genetic library.

2. **Cultural capital** consists of three major elements:

- Our "**built environment**," including: our manufacturing, transportation, communication, housing, and energy infrastructure.
- Our farms, ranches, and managed forests, which are all cultivated to create a "**second nature**."
- Our **economy**, which builds material wealth by transforming raw materials into useful products.

"We all live in the city. We all live in the country. In that paradox lies the measure of our moral responsibility for each other and for the world, whether urban or rural." - William Cronon

The Garden

The only sustainable occupation now open to Homo Sapiens is husbandry. In *Cultivating Nature*, Edwin Dobbs writes, "Creating an ecologically sound economic system is, of course, a long-range undertaking, far beyond the scope of the individual or even the community." But that is all the more reason for recognizing humbler domains, where the seeds of such a system might be found.

The "preservation of the world" might not be in wilderness, but in the backyard vegetable patch.

Gardeners do not visit nature, worship it, then withdraw quietly; they occupy it, and they get their hands dirty. Moreover, gardeners embrace their dilemma - they accept that they cannot get what they want without also doing what the garden wants. "In *Second Nature: A Gardeners Education*, Michael Pollan writes about becoming convinced that one cannot garden without making distinctions, without favoring one organism over another. He says "to weed is to bring culture to nature - which is why we say when we are weeding that we are cultivating the soil." The gardener's task implies an element of choice. Nature is the garden and we are the gardeners.

"By accepting human intervention as a natural act - indeed as an inescapable fact - the gardener discovers the limits of cultivation. Setting humanity apart from the earth and its community of life, denies the common ground that is the basis for accountability." - Michael Pollan

Cultivating a garden may seem to have little to do with managing a post-industrial economy. However, Edwin Dobbs makes some interesting observations:

- **The quality of the Gardner's "conversation" with the garden depends on scale.** Pollan's garden is of a size that permits timely responses to problems. Scale is also a concern for the citizen trying to address environmental problems. Responsibility is based on know-how, and real know-how, arising from a long, intimate process of give and take, cannot be extended beyond a certain scale.
- **The garden, like all of nature, is in a state of constant disturbance.** But because the disturbances are generally small and unfold at a slow pace, the dynamic garden still gives rise to sweet peas and squash season after season. Change itself is of little concern, compared with the frequency, kind and degree of change. The idea is to manage for the "recurrence of desirable conditions." But, the precondition for any such recurrence is nature's generative capacity, and human intervention in the natural world is prudent only to the degree that it maintains such a capacity.

Living Sustainably in our Natural and Built Environments

In dealing with economic development and the environment over the next decade we will have to learn to see the whole animal. Matter and energy flow into and out of the economy (i.e. throughput). Yet we often look at our economy as a circular flow of exchange value. It is as if a biologist tried to understand animals only in terms of

their circulatory systems, with no recognition of the fact they have digestive tracts. The metabolic flow is not circular. The digestive tract firmly ties the animal to its environment at both ends. Without digestive tracts, animals would be perpetual motion machines. The same would be true for an economy without entropic output (i.e. waste, heat). The following diagram is useful in understanding the whole animal:

Solar energy enters ecosystems in the watershed, including lakes, forests, wetlands, streams, and cropland.

In economic terms these are renewable resources. Renewable and non-renewable resources, along with labor, are used by the economic system including agriculture, forestry, and industry. Consumer goods and services, produced by the economic system, are directed to the population. Direct environmental services are "transferred" from ecosystems to the population. The process of economic production is accompanied by the generation of heat (leaving the system), wastes, and pollution feeding back to ecosystems. Wastes and pollution from towns and settlements are also directed to the environment.

We must maximize the net benefits of economic development, subject to maintaining the goods, services, and quality of the natural environment over time.

Conditions necessary for living sustainably on this planet:

- The human scale (population) must be limited within the remaining natural capital (i.e carrying capacity) of the earth.
- Technological progress must be efficiency VS throughput increasing. (i.e produce more with less)
- Harvesting rates of renewable resources must not exceed regeneration rates.
- Non-renewable resources should be used, but at a rate equal to the creation of sustainable substitutes.
- Waste emissions should not exceed the assimilative capacity of the environment.
- Energy must be conserved at every opportunity, because it is a limited commodity with major impacts on the biosphere.
- Products must be designed to go from cradle to cradle instead of cradle to grave.
- All costs, especially environmental costs, must be internalized and accounted for.

What is being sustained in "sustainable development" is a level, not a rate of growth of physical use. What is being developed is the qualitative capacity to convert that constant level of resource use into improved services for meeting human needs. Sustainability should be a condition of dynamic-equilibrium between the physical dimensions of the economy and the larger environment of which it is an open subsystem.

Sustainable development implies a different direction of technology progress, one that squeezes more service per unit of resource, rather than one that just runs more resource through the system, one that is efficiency increasing rather than throughput increasing.

Human Values

Abraham Maslow's hierarchy shows that people are not motivated by higher needs (e.g.sustainable development) until lower needs are met. Two billion people are without safe drinking water or sanitation, and 800 million do not get enough nourishment to even function. Roughly 95% of the projected population growth is taking place in "developing" countries where people are at the bottom of the hierarchy. This doesn't bode well for the global ecosystem, which we share.

A large body of research suggests we are all motivated by self-interest. Is it rational to ask people to sacrifice on behalf of the planet, or to assume that they will not and instead rig the economic choices so that we all find it rational to be an environmentalist? The September 1993 Atlantic had a fascinating article titled "Can Selfishness Save the Environment." The article says that many environmentalists fail to recognize that appeals should be made

to the self-interest and instead couch them in terms of sacrifice, selflessness, or increasingly, moral shame. However, there is a surprising convergence of economics and biology that may prove them wrong.

Where cooperation among individuals does evolve, it does so through tit-for-tat. A cautious exchange of favors enables trust to be built upon a scaffolding of individual reward.

Many economists and biologists agree that cooperation cannot be taken for granted. People and animals cooperate if they, as individuals, are given reasons to do so. For economists that means economic incentives; and for biologists it means the pursuit of short-term goals that were once the means to reproduction. The "selfish gene" theory asserts that humans and animals act altruistically only when it brings some benefit to copies of their own genes. This happens under two circumstances: when the altruist and the beneficiary are close relatives, such as bees in a hive, and when the altruist is in a position to have the favor returned at a later date (i.e. tit for tat). Environmental policy should be a matter of seeking the most enforceable, least bureaucratic, cheapest, and most cost effective incentives.

Incentives vs. Regulations

Capitalism has proven to be the best system for finding the lowest cost product or service and for driving out inefficient producers. Bruce Lippke, Director of the Center for International Trade in Forest Products (CINTRAFOR) at the University of Washington says that 9 time out of 10 it is the inefficient producer that is the worst polluter. He says that incentives are a much better way to internalize environmental costs than regulations, because regulations are always local and we regulate to the lowest common denominator.

One of our big challenges is the allocation of scare means (e.g. the forest land base, to the competing ends of environmental and commodity objectives.

Economic incentives and regulations are two means of achieving environmental benefits from managed forestlands. In a CINTRAFOR working paper, Bruce Lippke and Jeffrey Moffet say that regulations generally create disincentives for resource managers, by increasing costs and reducing output. Incentive mechanisms give forest managers the flexibility to turn their creativity loose in finding the lowest cost of providing environmental outputs. In this case, environmental outputs include longer rotations,, and silvicultural practices (e.g. thinning) which would create structural diversity in the stands, species diversity, water flow and quality benefits, and carbon sequestration.

Here are some of the conclusions they write in the paper, which explores alternatives for the management of Western Washington forests:

- Forest management policies and practices that are designed to increase the flow of environmental amenities will add direct operating costs that have previously been external to the cost of wood production.
- A primary reason why it has not been profitable to produce many environmental amenities is the lack of efficient market mechanisms to reimburse landowners for the additional marginal costs.
- An incentives approach to stimulating the production of environmental values provides a public policy alternative to regulation by motivating landowners and forest managers to adopt specific environmental and non-timber goals.
- Incentive mechanisms, such as tax credits, substitute for normal market responses by transferring payments to the landowners for achieving environmental goals.
- Incentives give timber producers the flexibility to find the lowest cost, and thus the most economically efficient means of environmental goals.
- Since forests change over time, the benefits of alternative management practices may not be felt for years or decades, while the investments and costs are likely to be more immediate.

Cost/Benefit Analysis

In any cost benefit analysis of forest practices we must first set a benchmark as to what the "desired future condition" of the forest should be. Certainly in the Pacific Northwest, and other areas, the public is saying that they want the forests to look like they did prior to European settlement. Since Native Americans were very proactive in modifying the forest landscape along with catastrophic events (e.g. fire, wind), the real ancient forests were a mosaic of stands in different stages of ecological succession. Due to disturbances there never was a perfect distribution or mix of structure across a landscape.

All forest stands can be classified as being in one of four basic stages of ecological succession.

- **Stand Imitation**
- **Stem Exclusion**
- **Understory Re-initiation**
- **Old Growth**

The landmark book "Forest Stand Dynamics" by Oliver and Larson helps us understand how forests function in space and time. In the past forests were shaped in large part by catastrophic events such as wildfire which caused great losses in wood fiber. Today we can mitigate the negative impacts of catastrophic events and yet mimic them using silvicultural prescriptions. Using the example of the four stand structures, Professor Oliver says "if we have too little of one structure.....then we must have too much of another. We could, as an example, have 50 percent of a forest stagnated in the stem exclusion stage. This represents an opportunity to produce wood from thinning and pruning operations while pushing the remaining trees into older structures and to produce high quality wood. This 'high quality forestry' requires incentives. First of all the landowner must be able to get more for the high quality (i.e larger, knot free) wood. Second the landowner must be compensated for additional costs and a delayed a return on his/her investment.

The World's Need for Wood

The world's need for wood will rise dramatically in view of population growth and increased per capita consumption. The best source of global wood production and consumption is the Food and Agricultural Organization (FAO) of the United Nations. The FAO which is based in Rome, Italy just came out with a new publication called "Forest Resource Assessment 1990" We have taken one of the graphics to show growth in wood fiber consumption in developed and developing nations. While population growth is much slower in developed nations the per capita industrial wood consumption is much higher. However the consumption of fuel-wood and charcoal is much higher in developing nations.

Just to meet the world's demand for industrial wood which is expected to grow to 2.7 billion cubic meters to 1.1 trillion board feet by the year 2010, we will have to manage commercial forest lands more intensively and establish more plantations. Forestry is a high risk and capital intensive business, so very strong incentives must be put in place to ensure that the world's most environmentally sound building material is in place to meet human needs. In developing nations deforestation continues at a rapid pace due primarily to land clearing for unsustainable subsistence agriculture and large scale ranching.

One of the best places to produce wood is in North America. It makes sense to source wood as close to home as possible especially in a place with state-of-the-art forestry, ideal growing conditions, and strong forest practice acts. It makes less sense to source wood in places where the costs and environmental impacts are much higher. It

makes even less sense to replace wood with substitute products, all of which have far higher impact on the environment.

Maintaining our Production Capacity

Adam Smith is considered the father of laissez faire capitalism. His book, "The Wealth of Nations" was published in 1776. Capitalism has proven to be a wonderful system for economic vitality and efficiency. Every democracy in the world is capitalist. Smith was a strong advocate of free trade. The whole idea behind laissez faire capitalism is that it's the best deal for the consumer. However, what is good for the consumer in the short run may not be as good in the long run. Friedrich List who wrote "The Natural System of Political Economy" in 1837, argued that a society's well-being and its overall wealth are determined not by what a society can buy, but by what it can make. List was not concerned with the morality of consumption, instead he was concerned with strategic and material well-being. List wrote, "The forces of production are the tree on which wealth grows."

Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime.

In economics and politics alike, Anglo-American theory emphasizes how the game is played, not who wins or loses. If the rules are fair, the best candidate will win, be it an Abraham Lincoln or a Warren Harding. The government is involved only to guard the process rather than steer the results. The assumption behind the Anglo-American model is that if you take care of the individuals (consumers) the communities and nations will take care of themselves. The German view (List) is more concerned with the welfare, indeed sovereignty, of people in groups-in communities, in nations. This is the most common link with the Asian strategies of today. The most uplifting part of the Anglo-American view is that everyone can prosper at once. The German's had a more tragic or "zero-sum" conception of how nations dealt with one another. However, it is true that all nations that have risen in the ranks economically have done so by putting the emphasis on building their production capacity, even if it meant bending the rules of laissez faire. In the world today it is important to recognize that these two brands of capitalism Anglo-America and German-Asian are both in play. The first assumes a more or less horizontal relationship among nations, which joust as more or less equal rivals. The second assumes that nations have always been organized virtually in a hierarchical division of labor. The American writer John Judis wrote, "the structure of the world economy more accurately resembles a pyramid than a plane." The US came out of World War II on top of the pyramid, after building its production capacity.

Democracy and capitalism have triumphed over socialism around the world. Now the question is, how do we all compete in a global marketplace and still protect the ecosystems on which we and our economy depend? Certainly we must account for environmental costs on a local, regional, national and international basis including:

1. The cost of the actual damage done by one production system to another system, person, or place.
2. The cost to future generations caused by environmental degradation.

What we need most is an ethical vision for the future and sound principles to guide it. That vision is Sustainable Development which places the emphasis on quality of life for current and future generations.. We need to put the incentives in place to achieve our goals. The market will take care of producing the best product at the lowest cost (efficiency), but it is our values, which will decide if we are going to do the right thing (effectiveness). Let's start by deciding what we want out of our forests (benefits) and what we are willing to pay (costs). Let's also remember that in the end, human values are going to be the most important and most difficult part of the equation.

The human capacity to imagine, to consciously pull together unrelated pieces of knowledge and produce new answers, is what makes economic evolution happen so much faster than biological evolution. Nonetheless, the fundamental process, turning profits earned today into information for tomorrow, is the same for both organisms and organizations. In both realms, profits make possible the natural process of growth and renewal.

Be bold and courageous. When you look back on your life, you'll regret the things you didn't do more than the ones you did.

Sources:

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