

## John Pesek Colloquium on Sustainable Agriculture

# Ecological Economics: Creating a Sustainable and Desirable Future

### Robert Costanza

Gordon and Lulie Gund Professor of Ecological Economics  
and Director, Gund Institute for Ecological Economics

Rubenstein School of Environment and Natural Resources

The University of Vermont, 617 Main Street, Burlington, VT 05405-1708

Telephone: 802.656.2974

email: [Robert.Costanza@uvm.edu](mailto:Robert.Costanza@uvm.edu)

The economies of China and India are growing at an enormous clip. But they seem to be making all the same environmental mistakes that western countries made during their development - with a vengeance this time, given their enormous populations. And their “real” economic improvements, once the non-marketed costs of environmental and health damages are subtracted, may turn out to be negligible. Is this an inevitable by-product of development that they will eventually “grow out of”? Or is there something inherently wrong with the basic mainstream model of development? Is there a better way?

The mainstream model of development (also known as the “Washington consensus”) is based on a number of assumptions about the way the world works, what the economy is, and what the economy is for (Table 1). These assumptions were created during a period when the world was still relatively empty of humans and their built infrastructure. In this “empty world” context, built capital was the limiting factor, while natural capital and social capital were abundant. It made sense, in that context, not to worry too much about environmental and social “externalities” since they could be assumed to be relatively small and ultimately solvable. It made sense to focus on the growth of the market economy, as measured by GDP, as a primary means to improve human welfare. It made sense, in that context, to think of the economy as only marketed goods and services and to think of the goal as increasing the amount of these goods and services produced and consumed.

But the world has changed dramatically. We now live in a world relatively full of humans and their built capital infrastructure. In this new context, we have to reconceptualize what the economy is and what it is for. We have to first remember that the goal of the economy is to sustainably improve human well-being and quality of life. We have to remember that material consumption and GDP are merely means to that end, not ends in themselves. We have to recognize, as both ancient wisdom and new psychological research tell us, that material consumption beyond real need can actually reduce our well-being. We have to better understand what really does contribute to sustainable human well-being, and recognize the substantial contributions of natural and social capital, which are now the limiting factors to sustainable human well-being in many countries. We have to be able to distinguish between real poverty in terms of low quality of life, and merely low monetary income. Ultimately we have to create a new vision of what the economy is and what it is for, and a new model of development that acknowledges this new full world context and vision (Table 1).

## **Some History**

The World Bank (WB) and the International Monetary Fund (IMF), founded at the Bretton Woods conference at the end of World War II, were chartered to speed economic development, stabilize the world economy, and end poverty. These institutions have relied largely on “the Washington Consensus” as described above and in Table 1. The inability of these institutions and the World Trade Organization (WTO) to achieve their original goals of improving lives in the developing world and stabilizing the global economy has given rise to many critics, who are no longer marginalized voices of the displeased but include former World Bank economists, the G-77, and the thousands of people in borrowing countries that have taken to the streets in protest all over the world. These policies include removing barriers that check corporate access to a country’s resources, often including the removal of social and environmental legislation. They are antithetical to the goal of developing in a way that is sustainable and equitable. They are by no means a “consensus”, but rather dictates of a few powerful countries and their attendant organizations. Driven by lending countries and their economists, borrowing nations have had little say in policies attached to loans - cuts to government salaries, and privatizing social services. In short, the execution of this model of development has led to unemployment, falling worker wages, biodiversity loss, environmental degradation, and disintegration of the social fabric. For example, the conditional loans foisted on many Latin American countries resulted in massive unemployment and devastating economic crises.

Critics of the current model are many, and a coherent and viable alternative is sorely needed. Here I sketch a new model of development based on the world view and principles of ecological economics – the idea that growth and development are not always linked and that true development must be defined in terms of the improvement of quality of life, not merely improvement in material consumption.

## **Quality of life, happiness, and the real economy**

There is a substantial body of new research on what actually contributes to human well-being and quality of life. This new “science of happiness” clearly demonstrates the limits of conventional economic income and consumption in contributing to well-being. Psychologist Tim Kasser in his 2003 book “The High Price of Materialism” points out, for instance, that people who focus on material consumption as a path to happiness are actually less happy and even suffer higher rates of both physical and mental illnesses than those who do not. Material consumption beyond real need is a form of psychological “junk food” that only satisfies for the moment and ultimately leads to depression, Kasser says.

Economist Richard Easterlin, has shown that well-being tends to correlate well with health, level of education, and marital status, and not very well with income beyond a certain fairly low threshold. He concludes in a recent paper in the *Proceedings of the National Academy of Sciences* that, “People make decisions assuming that more income, comfort, and positional goods will make them happier, failing to recognize that hedonic adaptation and social comparison will come into play, raise their aspirations to about the same extent as their actual gains, and leave them feeling no happier than before. As a result, most individuals spend a disproportionate amount of their lives working to make money, and sacrifice family life and health, domains in which aspirations remain fairly constant as actual circumstances change, and where the attainment of one’s goals has a more lasting impact on happiness. Hence, a reallocation of time in favor of family life and health would, on average, increase individual happiness.” British economist Richard Layard’s 2005 book: “Happiness: lessons from a new science,” synthesizes many of these ideas and concludes that current economic policies are not

improving happiness and that “happiness should become the goal of policy, and the progress of national happiness should be measured and analyzed as closely as the growth of GNP.”

Economist Robert Frank, in his 2000 book “Luxury Fever,” also concludes that some nations would be better off – overall national well-being would be higher, that is – if we actually consumed less and spent more time with family and friends, working for our communities, maintaining our physical and mental health, and enjoying nature.

On this last point, there is substantial and growing evidence that natural systems contribute heavily to human well-being. In a paper published in 1997 in the journal *Nature*, my co-authors and I estimated the annual, non-market value of the earth’s ecosystem services at substantially larger than global GDP. The recent UN Millennium Ecosystem Assessment is a global update and compendium of ecosystem services and their contributions to human well-being.

So, if we want to assess the “real” economy – all the things which contribute to real, sustainable, human well-being – as opposed to only the “market” economy, we have to measure and include the non-marketed contributions to human well-being from nature, from family, friends and other social relationships at many scales, and from health and education. One convenient way to summarize these contributions is to group them into four basic types of capital that are necessary to support the real, human-well-being-producing economy: built capital, human capital, social capital, and natural capital.

The market economy covers mainly built capital (factories, offices, and other built infrastructure and their products) and part of human capital (spending on labor, health and education), with some limited spillover into the other two. Human capital includes the health, knowledge, and all the other attributes of individual humans that allow them to function in a complex society. Social capital includes all the formal and informal networks among people: family, friends, and neighbors, as well as social institutions at all levels, like churches, social clubs, local, state, and national governments, NGO’s, and international organizations. Natural capital includes the world’s ecosystems and all the services they provide. Ecosystem services occur at many scales, from climate regulation at the global scale, to flood protection, soil formation, nutrient cycling, recreation, and aesthetic services at the local and regional scales.

## **Ecosystem Services**

There is substantial and growing evidence that natural capital and ecosystem services contribute heavily to human well-being. In a paper published in 1997 in the journal *Nature*, my co-workers and I estimated that the annual, nonmarket value of the Earth’s ecosystem services was at least \$33 trillion globally, substantially larger than global GDP at the time. The recent UN Millennium Ecosystem Assessment is a global update and compendium of ecosystem services and their contributions to human well-being. This implies that the *real* economy, all those assets that contribute to human well-being, has major components that are outside the market in the form of natural and social capital.

In a paper published in the journal *Science*, Andrew Balmford, myself and several colleagues estimated that the overall benefit:cost ratio of an effective global program for the conservation of remaining natural capital is at least 100:1. This program consisted of expanding protected areas to cover 15% of the land surface (from about 6% currently) and 30% of the ocean surface (from almost zero currently). The cost of such a program was estimated to be around \$45 Billion/yr, but the benefits, in terms of the difference between the value of ecosystem services in the “wild” state minus the value of the most likely human-dominated alternative land use, was at least \$4-5 Trillion/yr.

## **Agriculture and Ecosystem Services**

In addition to preserving and restoring ecosystem services from natural ecosystems, we can make significant progress by *restoring and improving* ecosystem services in agro-ecosystems, without decreasing crop production. Agricultural landscapes represent a unique mix of natural and human-made capital. How these elements interact determines their overall productivity, value, and sustainability. Modern industrial agriculture has tended to ignore those ecosystem services that do not directly benefit crop production and which are external to the market, leading to significantly lower total social value than an approach which recognizes the value of ecosystem services from agricultural landscapes and tries to optimize that value in combination with marketable outputs. A better approach is one focused on the *total asset value* of the landscape (including both natural and human-made capital). Such an approach is more complex, biodiverse and sociodiverse, is less dependent on external subsidies of fuel, fertilizer, water, and machinery, and is more resilient.

Agro-ecosystem services have not been as well studied as services from natural ecosystems, but because of the large area of cropland around the world, improvements here can make a huge difference. For example, the total global cropland area has been estimated by Jon Foley and colleagues to be about 1.8 billion ha. If we can double the average ecosystem service value of these areas from \$1000/ha/yr to \$2000/ha/yr, with minimal to positive effects on crop production and value (a very viable goal I think) then we can increase the value of global ecosystem services by \$1.8 Trillion/yr

Establishing common property trusts for the public goods elements of agricultural landscapes and systems of payment for ecosystem services provided by agricultural landscapes can help achieve the desired transition.

## **Are we really making progress?**

Given these definitions of the real economy, are we really making progress? Is the mainstream development model really working, even in the “developed” countries? One way to tell is through surveys of people’s life satisfaction, which have been relatively flat in the US and many other developed countries since about 1975. A second approach is an aggregate measure of the real economy that has been developed as an alternative to GDP called the Genuine Progress Indicator, or GPI.

Let’s first take a quick look at the problems with GDP as a measure of true human well-being. GDP is not only limited – measuring only marketed economic activity or gross income -- it also counts all of this activity as positive. It does not separate desirable, well-being-enhancing activity from undesirable well-being-reducing activity. For example, an oil spill increases GDP because someone has to clean it up, but it obviously detracts from society’s well-being. From the perspective of GDP, more crime, more sickness, more war, more pollution, more fires, storms, and pestilence are all potentially good things, because they can increase marketed activity in the economy.

GDP also leaves out many things that *do* enhance well-being but are outside the market. For example, the unpaid work of parents caring for their own children at home doesn't show up, but if these same parents decide to work outside the home to pay for child care, GDP suddenly increases. The non-marketed work of natural capital in providing clean air and water, food, natural resources, and other ecosystem services doesn’t adequately show up in GDP, either, but if those services are damaged and we have to pay to fix or replace them, then GDP suddenly increases. Finally, GDP takes no account of the distribution of income among individuals. But it is well-known that an additional \$1 worth of income produces more well-being if one is poor

rather than rich. It is also clear that a highly skewed income distribution has negative effects on a society's social capital.

The GPI addresses these problems by separating the positive from the negative components of marketed economic activity, adding in estimates of the value of non-marketed goods and services provided by natural, human, and social capital, and adjusting for income-distribution effects. While it is by no means a perfect representation of the real well-being of nations, GPI is a much better approximation than GDP. As Amartya Sen and others have noted, it is much better to be approximately right in these measures than precisely wrong.

Comparing GDP and GPI for the US shows that, while GDP has steadily increased since 1950, with the occasional dip or recession, GPI peaked in about 1975 and has been flat or gradually decreasing ever since. From the perspective of the real economy, as opposed to just the market economy, the U.S. has been in recession since 1975. As already mentioned, this picture is also consistent with survey-based research on people's stated life-satisfaction. The US and several other developed countries are now in a period of what Herman Daly has called "un-economic growth," where further growth in marketed economic activity (GDP) is actually reducing well-being on balance rather than enhancing it. In terms of the four capitals, while built capital has grown, human, social and natural capital have declined or remained constant and more than canceled out the gains in built capital.

Is this really the model of development that "developing" countries should aspire to?

### **A new sustainable, ecological model of development**

A new model of development consistent with our new full world context (Table 1) would be based clearly on the goal of sustainable human well-being. It would use measures of progress that clearly acknowledge this goal (i.e. GPI instead of GDP). It would acknowledge the importance of ecological sustainability, social fairness, and real economic efficiency.

Ecological sustainability implies recognizing that natural and social capital are not infinitely substitutable for built and human capital, and that real biophysical limits exist to the expansion of the market economy. Climate change is perhaps the most obvious and compelling of these limits.

Social fairness implies recognizing that the distribution of wealth is an important determinant of social capital and quality of life. The conventional development model, while explicitly aimed at reducing poverty, has bought into the assumption that the best way to do this is through growth in GDP. This has not proven to be the case and explicit attention to distribution issues is sorely needed. As Robert Frank has argued in his latest book: *Falling behind: how rising inequality harms the middle class*, economic growth beyond a certain point sets up a "positional arms race" that changes the consumption context and forces everyone to consume too much of positional goods (like houses and cars) at the expense of non-marketed, non-positional goods and services from natural and social capital. Increasing inequality of income actually reduces overall societal well-being, not just for the poor, but across the income spectrum.

Real economic efficiency implies including all resources that affect sustainable human well-being in the allocation system, not just marketed goods and services. Our current market allocation system excludes most non-marketed natural and social capital assets and services that are huge contributors to human well-being. The current development model ignores this and therefore does not achieve real economic efficiency. A new, sustainable ecological development model would measure and include the contributions of natural and social capital and could better approximate real economic efficiency.

The new development model would also acknowledge that a complex range of property rights regimes are necessary to adequately manage the full range of resources that contribute to

human well-being. For example, most natural and social capital assets are public goods. Making them private property does not work well. On the other hand, leaving them as open access resources (with no property rights) does not work well either. What is needed is a third way to *propertize* these resources without privatizing them. Several new (and old) common property rights systems have been proposed to achieve this goal, including various forms of common property trusts.

The role of government also needs to be reinvented. In addition to government's role in regulating and policing the private market economy, it has a significant role to play in expanding the "commons sector", that can propertize and manage non-marketed natural and social capital assets. It also has a major role to play as facilitator of societal development of a shared vision of what a sustainable and desirable future would look like. As Tom Prugh, myself, and Herman Daly have argued in our book "The Local Politics of Global Sustainability," strong democracy based on developing a shared vision is an essential prerequisite to building a sustainable and desirable future. This new vision implies a core set of principles for sustainable governance.

### **Principles of sustainable governance**

The key to achieving sustainable governance in the new full world context is an integrated (across disciplines, stakeholder groups, and generations) approach based on the paradigm of "adaptive management," whereby policy-making is an iterative experiment acknowledging uncertainty, rather than a static "answer". Within this paradigm, my colleagues and I, in a paper published in *Science* in 1998, identified six core principles (the Lisbon principles) that embody the essential criteria for sustainable governance. Some of them are already well accepted in the international community (for example, Principle 3); others are variations on well-known themes (for example, Principle 2 is an extension of the subsidiary principle); while others are relatively new in international policy, although they have been well developed elsewhere (for example, Principle 4). The six Principles together form an indivisible collection of basic guidelines governing the use of common natural and social capital assets.

- *Principle 1: Responsibility.* Access to common asset resources carries attendant responsibilities to use them in an ecologically sustainable, economically efficient, and socially fair manner. Individual and corporate responsibilities and incentives should be aligned with each other and with broad social and ecological goals.
- *Principle 2: Scale-matching.* Problems of managing natural and social capital assets are rarely confined to a single scale. Decision-making should (i) be assigned to institutional levels that maximize input, (ii) ensure the flow of information between institutional levels, (iii) take ownership and actors into account, and (iv) internalize costs and benefits. Appropriate scales of governance will be those that have the most relevant information, can respond quickly and efficiently, and are able to integrate across scale boundaries.
- *Principle 3: Precaution.* In the face of uncertainty about potentially irreversible impacts to natural and social capital assets, decisions concerning their use should err on the side of caution. The burden of proof should shift to those whose activities potentially damage natural and social capital.
- *Principle 4: Adaptive management.* Given that some level of uncertainty always exists in common asset management, decision-makers should continuously gather and integrate appropriate ecological, social, and economic information with the goal of adaptive improvement.
- *Principle 5: Full cost allocation.* All of the internal and external costs and benefits, including social and ecological, of alternative decisions concerning the use of natural and social capital should be identified and allocated. When appropriate, markets should be adjusted to reflect full costs.

- *Principle 6: Participation.* All stakeholders should be engaged in the formulation and implementation of decisions concerning natural and social capital assets. Full stakeholder awareness and participation contributes to credible, accepted rules that identify and assign the corresponding responsibilities appropriately.

### **Some policies to achieve real, sustainable development**

The conventional development model is not working, for either the developed or the developing world. It is not sustainable and it is also not desirable. It is based on a now obsolete empty world vision and it is leading us to disaster.

We need to accept that we now live in a full world context where natural and social capital are the limiting factors. We could achieve a much higher quality of life, and one that would be ecologically sustainable, socially fair, and economically efficient, if we shift to a new sustainable development paradigm that incorporates these principles.

The problem is that our entire modern global civilization is, as even President Bush has acknowledged, "addicted to oil" and addicted to consumption and the conventional development model in general. An addictive substance is something one has developed a dependence on, which is either not necessary or harmful to one's longer-term well-being. Fossil fuels (and excessive material consumption in general) fit the bill. We can power our economies with renewable energy, and we can be happier with lower levels of consumption, but we must first break our addiction to fossil fuels, consumption, and the conventional development model, and as any addict can tell you: "that ain't easy." But in order to break an addiction of any kind, one must first clearly see the benefits of breaking it, and the costs of remaining addicted, facts that accumulating studies like the IPCC reports, the Stern Review, the Millennium Ecosystem Assessment and many others are making more apparent every day.

What else can we do to help break this addiction? Here are just a few suggestions.

- Create and share a vision of a future with zero fossil fuel use and a quality of life higher than today. That will involve understanding that GDP is a means to an end, not the end itself, and that in some countries today more GDP actually results in less human well-being. It will require an entirely new and broader vision of what the economy is, what it's for, and how it functions.
- Convene a "new Bretton Woods" conference to establish the new measures and institutions needed to replace GDP, the World Bank, the IMF, and the WTO. These new institutions would promote:
- Shifting primary national policy goals from increasing marketed economic activity (GDP) to maximizing national well-being (GPI or something similar). This would allow us to see the interconnections between built, human, social, and natural capital and build well-being in a balanced and sustainable way.
- Reforming tax systems to send the right incentives by taxing negatives (pollution, depletion of natural capital, overconsumption) rather than positives (labor, savings, investment).
- Expanding the commons sector by developing new institutions that can propertize the commons without privatizing them. Examples include various forms of common asset trusts, like the atmospheric (or sky) trust proposed by Peter Barnes coupled with payments for depletion of natural and social capital and rewards for protection of these assets.
- Reforming international trade to promote well-being over mere GDP growth. This implies protecting natural capital, labor rights, and democratic self-determination first

and *then* allowing trade, rather than promoting the current trade rules that ride roughshod over all other societal values and ignore non-market contributions to well-being.

We can break our addiction to fossil fuels, overconsumption, and the current development model and create a more sustainable and desirable future. It will not be easy, it will require a new vision, new measures, and new institutions. It will require a redesign of our entire society. But it is not a sacrifice of quality of life to break this addiction. Quite the contrary, it is a sacrifice not to.

Table 1. Basic characteristics of the current development model and the emerging sustainable and desirable “ecological economics” development model

	<b>Current Development Model:</b> the “Washington Consensus”	<b>Sustainable and Desirable Development Model:</b> an emerging “Green Consensus”
<b>Primary policy goal</b>	<b>More:</b> economic growth in the conventional sense, as measured by GDP. The assumption is that growth will ultimately allow the solution of all other problems. More is always better.	<b>Better:</b> Focus must shift from merely growth to “development” in the real sense of improvement in quality of life, recognizing that growth has negative by-products and more is not always better.
<b>Primary measure of progress</b>	GDP	GPI (or similar)
<b>Scale/carrying capacity</b>	Not an issue since markets are assumed to be able to overcome any resource limits via new technology and substitutes for resources are always available	A primary concern as a determinant of ecological sustainability. Natural capital and ecosystem services are not infinitely substitutable and real limits exist
<b>Distribution/poverty</b>	Lip service, but relegated to “politics” and a “trickle down” policy: a rising tide lifts all boats	A primary concern since it directly affects quality of life and social capital and in some very real senses is often exacerbated by growth: a too rapidly rising tide only lifts yachts, while swamping small boats
<b>Economic efficiency/allocation</b>	The primary concern, but generally including only marketed goods and services (GDP) and institutions	A primary concern, but including both market and non-market goods and services and effects. Emphasizes the need to incorporate the value of natural and social capital to achieve true allocative efficiency
<b>Property rights</b>	Emphasis on private property and conventional markets	Emphasis on a balance of property rights regimes appropriate to the nature and scale of the system, and a linking of rights with responsibilities. A larger role for common property institutions in addition to private and state property
<b>Role of Government</b>	To be minimized and replaced with private and market institutions	A central role, including new functions as referee, facilitator and broker in a new suite of common asset institutions
<b>Principles of Governance</b>	<i>Laissez faire</i> market capitalism	Lisbon principles of sustainable governance