

Creating a Sustainable and Desirable Future

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When asked if, after independence, India would attain the British standard of living, Mahatma Gandhi replied, "...it took Britain half the resources of the planet to achieve its prosperity; how many planets will a country like India require?"

I. The Current Human Dilemma

*H*istorically, the recognition by humans of their impact upon the earth has consistently lagged behind the magnitude of the damage they have imposed, thus seriously weakening efforts to control this damage. In the former U.S.S.R., for example, sharply increasing infant mortality rates and actual declines in life expectancy attest to the dangers of massive accumulations of pollution stocks and neglect of public health. Yet even today, technological optimists and others find it more comfortable to ignore the mounting evidence of global environmental degradation (until it intrudes more inescapably upon their personal welfare).

Gross Domestic Product (GDP) and other current measures of national income are notorious for overweighting market transactions, understating resource depletion, omitting pollution damage, and failing to measure real changes in well-being. Increases in life expectancies in many nations, by contrast, clearly indicate improvements in welfare, but unless accompanied by corresponding decreases in birth rates, they are forecast an acceleration in population growth, which will compound all other environmental problems.

The pervasiveness of uncertainty about our ecological life-support systems emphasizes the need for building precautionary minimum safety standards into our environmental policies.¹ The fact that some environmental problems may have been overestimated, and that the magnitude of any one of these problems can be debated, does not

reduce the urgency of seeking the underlying patterns from the many indicators of what is happening.

Only recently—with advances in environmental sciences, global remote sensing and other monitoring systems—has a more comprehensive assessment of local and global environmental deterioration become possible. Evidence is accumulating with respect to accelerating loss of vital rain forests, species extinction, depletion of ocean fisheries, shortages of fresh water in some areas and increased flooding in others, soil erosion, depletion and pollution of underground aquifers, decreases in the quantity and quality of irrigation and drinking water, growing global pollution of the atmosphere and oceans (even in the polar regions), and global climate disruption. The growth of human populations is rapidly crowding out other species before we have begun to understand fully our dependence upon species diversity. Although post-Cold War conflicts—such as those in Haiti, Somalia, Sudan, and Rwanda—are characterized in part by tribal elements, territorial overcrowding and food shortages cannot be ruled out as contributing factors. Consequently, they serve as additional early warning indicators of accumulating global environmental problems.

Clearly, remedial policy responses to date have been local, partial, and inadequate. Early policy discussions and the resulting responses tended to focus upon symptoms of environmental damage rather than upon basic causes, and policy instruments tended to be ad hoc rather than carefully designed for sustainability. For example, in the 1970s, emphasis was focused on pollution control, which, while a serious problem, was actually a symptom and a result of expanding populations and explosive technologies. These phenomena fueled the exponential growth of material and energy throughput and threatened the recuperative powers of the planet.

As a result of early perceptions of environmental damage, much was learned about policies and instruments for attacking pollution. The basic environmental problems for which we need innovative policies and management instruments are:

- Unsustainably large and growing human impacts that exceed the planetary boundaries of the earth;
- Highly entropy-increasing technologies that mine the earth of its resources, and whose unassimilated wastes poison the air, water, and land;

- Land conversion, which destroys habitat, increases soil erosion, and accelerates loss of species diversity.

These problems are all evidence that the material scale of human activity threatens to exceed the sustainable carrying capacity of the earth. We should adopt courses of action that are based upon a fair distribution of resources and opportunities between present and future generations. In addition, they must be based upon an economically efficient allocation of resources that adequately accounts for protecting the stock of natural capital.

Historically, severe human-caused damage to some regions of the earth began as soon as humans learned to apply highly entropy-increasing technological processes to agriculture, and was sharply escalated by factory production in Europe during the Industrial Revolution. Early public policy responses were feeble to nonexistent, allowing polluters, whose political and economic power came to eclipse that of the feudal magnates, to gain *de facto* property rights to emit wastes into the common property resources of air and water. In England, it was not until the urban agglomeration in London—with its choking smog from coal fires and stench from human waste in the Thames—that discomfited Parliamentarians took action. Predictably, the response was to pass parliamentary laws regulating the burning of coal. These regulations were largely ineffectual for centuries. Eventually, in the 20th century, when epidemics of smog-induced deaths increased in severity and could be statistically documented, cleaner heating technologies were adopted.

Even more massive loss of life from water-borne diseases continued to be accepted as part of the human condition until advances in scientific knowledge concerning the role of microorganisms prompted public health research to develop sewage treatment and water purification systems. Vast urban expenditures on such systems eventually reduced the enormous loss of human capital from the uncontrolled discharge of human waste into common property waterways. The application of appropriate science, appropriate technology, and community *will* was necessary to reduce the costly loss of human capital that had resulted from unprecedented population expansion, the concentration of humans into unplanned urban locations, and the uncompensated appropriation of common property resources for waste disposal.

Homo sapiens is at another turning point in its relatively long and (so far) inordinately successful history. Our species' activities on the

planet have now become of so large a scale that they are beginning to affect the ecological life-support system itself. The entire concept of economic *growth* (defined as increasing material consumption) must be rethought, especially as a solution to the growing host of interrelated social, economic, and environmental problems. What we need now is real economic and social *development* (i.e., qualitative improvement without growth in resource throughput) and a direct and explicit recognition of the interrelatedness and interdependence of all aspects of life on the planet. We need to move from an economic model that ignores this interdependence to one that acknowledges and builds upon it. The goal is an economics that is fundamentally *ecological* in its basic view of the problems that now face our species at this crucial point in our history.

This new *ecological economics* is, in a very real sense, a return to the classical roots of economics. It is a return to a point when economics and the other sciences were integrated rather than academically isolated, as they are now. Ecological economics is an attempt to transcend the narrow disciplinary boundaries that have grown up in the last century in order to bring the full power of our intellectual capital to bear on the huge problems we now face.

The current dilemma of our species can be summarized in ecological terms as follows: We have moved from an early successional "empty world," in which the emphasis and rewards were on rapid growth and expansion, cutthroat competition, and open waste cycles, to a maturing "full world," in which the emphasis and rewards are on qualitative improvement of the linkages between components (development), cooperative alliances, and recycled "closed loop" waste flows.

Can we recognize these fundamental changes and reorganize our society rapidly enough to avoid a catastrophic overshoot? Can we be humble enough to acknowledge the huge uncertainties involved and protect ourselves from their most dire consequences? Will we be able to effectively develop policies to deal with the very tricky issues of wealth distribution, population control, international trade, and energy supply in a world where the simplistic palliative of "more growth" is no longer a solution? Can we modify our systems of governance at international, national, and local levels to be better adapted to these new and more difficult challenges?

Homo sapiens has successfully adapted to huge challenges in the past. We developed agriculture as a response to the limits of hunting and gathering. We developed an industrial society to adapt to the

potential of concentrated forms of energy. Now the challenge is to live sustainably and well, but within the material limits of a finite planet. Humans have an ability to conceptualize their world and foresee the future that is more highly developed than in any other species. Can we use this skill to meet the new challenge of sustainability?

II. The Current Crisis and the Need for a New Model

The 2008 financial meltdown was the result of under-regulated markets built on an ideology of free market capitalism and unlimited economic growth. The fundamental problem is that the underlying assumptions of this ideology are not consistent with what we now know about the real state of the world. As Thomas Friedman said in a March 7, 2009, op-ed in *The New York Times*: “What if the crisis of 2008 represents something much more fundamental than a deep recession? What if it’s telling us that the whole growth model we created over the last 50 years is simply unsustainable economically and ecologically and that 2008 was when we hit the wall—when Mother Nature and the market both said: ‘No more.’”

The financial world is, in essence, a set of markers for goods, services, and risks in the real world. When those markers are allowed to deviate too far from reality, “adjustments” must ultimately follow and crisis and panic can ensue. This problem was identified as far back as the work of Frederick Soddy in the 1930s.² To solve this and future financial crises requires that we reconnect the markers with reality. What are our real assets and how valuable are they? To do this requires a new vision of what the economy *is* and what it is *for*, proper and comprehensive accounting of real assets, and new institutions that use the market in its proper role of servant rather than master.

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

Table 1. Basic Characteristics of the Current Development Model and the Emerging Sustainable and Desirable “Ecological Economics” Development Model.

	Current Development Model: the “Washington Consensus”	Sustainable and Desirable Development Model: an emerging “Green Consensus”
Primary policy goal	More: 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.	Better: 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.
Primary measure of progress	GDP	GPI (or similar)
Scale/carrying capacity	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
Distribution/poverty	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
Economic efficiency/ allocation	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
Property rights	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
Role of Government	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
Principles of Governance	Laissez-faire market capitalism	Lisbon principles of sustainable governance

improve human welfare. It made sense to think of the economy solely as 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 must 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. 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 versus 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).

III. 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.³ This new “science of happiness” clearly demonstrates the limits of conventional economic income and consumption in contributing to well-being. Kasser 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.⁴ Material consumption beyond real need is a form of psychological “junk food” that only satisfies for the moment but ultimately leads to depression.

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 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.⁵

Richard Layard 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."⁶ Robert Frank 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.⁷

On this last point, there is substantial and growing evidence that natural systems contribute enormously to human well-being. My colleagues and I estimated the annual, non-market value of the earth's ecosystem services at \$33 trillion/year, substantially larger than global GDP at the time and yet almost certainly a conservative underestimate.⁸ The United Nations Millennium Ecosystem Assessment of 2005 is also a useful global compendium of the status and trends in ecosystem services and their contributions to human well-being.

If we want to assess the "real" economy—all the things contributing 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, family, friends, and other social relationships at many scales, and from health status 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 mainly covers built capital (factories, offices, and other infrastructure, and their products) and part of human capital (spending on labor, health, and education), with limited spillover into the other two categories. 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, non-governmental organizations, 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.

IV. Are We Really Making Progress?

Given this definition 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 United States 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. It was called the Index of Sustainable Economic Welfare⁹ and more recently renamed the Genuine Progress Indicator (GPI).¹⁰

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 and funds are expended, but it obviously detracts from society's well-being. From the perspective of GDP, more crime, sickness, war, pollution, fires, storms, and pestilence are all potentially good things, because they can increase market 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 children at home does not get recorded, but if these same parents decide to work outside the home to pay for childcare, then GDP increases. The non-marketed work of natural capital in providing clean air and water, food, natural resources, and other ecosystem services does not adequately appear in GDP statistics 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. Yet, it is well known that an

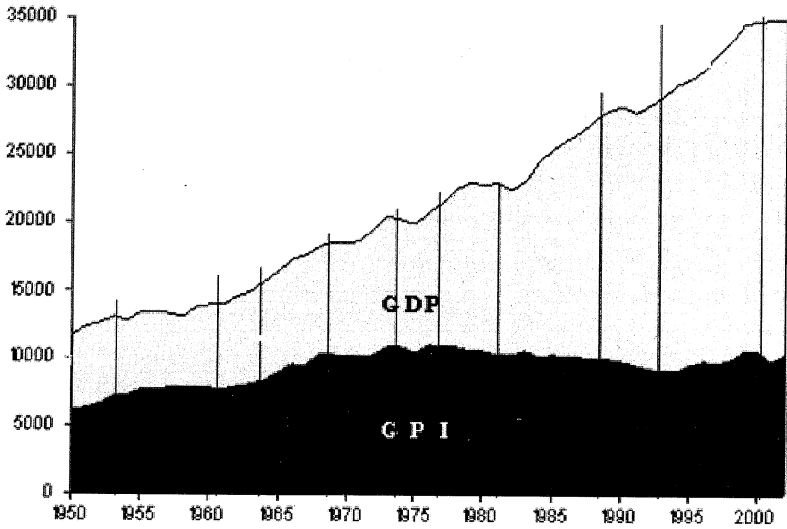


Figure 1. Gross Domestic Product (GDP) per capita and Genuine Progress Indicator (GPI) for the United States from 1950 to 2002 (Source: Redefining Progress: <http://www.rprogress.org>).

additional one-dollar's worth of income produces more well-being if one is poor rather than rich. It is also clear that 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 more useful 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 U.S. (Figure 1) 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, 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 U.S. and several other developed countries are now in a period of what Herman Daly has called "un-economic growth." In other words, further growth in market economic activity (GDP) is on

balance reducing well-being rather than enhancing it. In terms of the four types of capital, built capital has grown but human, social, and natural capital have declined or remained constant and more than canceled out the gains in built capital.

V. A New Sustainable Ecological Model of Development

A new model of development consistent with our new full-world context would be based 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 be premised on the importance of ecological sustainability, social fairness, and real economic efficiency.

Ecological sustainability is based on recognition that natural and social capital are not infinitely substitutable for built and human capital, and that real bio-physical limits exist to the expansion of the market economy. Climate change is perhaps the most obvious and compelling of these limits.

Social fairness means 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 acceded to the assumption that the best way to do this is through growth in GDP. This has not proved to be the case and explicit attention to distribution issues is sorely needed. As Frank has argued, 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 very visible positional goods (like houses and cars) at the expense of non-marketed, non-positional goods and services from natural and social capital.¹¹ 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 the societal development of a shared vision of what a sustainable and desirable future would look like. Strong democracy based on developing a shared vision is an essential prerequisite to building such a future.¹² This new vision implies a core set of principles for sustainable governance.

A. Principles of Sustainable Governance

The key to achieving sustainable governance in the new full-world context is an integrated approach (across disciplines, stakeholder groups, and generations) based on the paradigm of “adaptive management,” whereby policy-making is an iterative experiment acknowledging uncertainty, rather than a static “answer.” Within this paradigm, six core principles (the Lisbon Principles) that embody the essential criteria for sustainable governance have been proposed.¹³ 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 cor-

porate 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.

VI. Some Policies to Achieve Real, Sustainable Development

The conventional development model is not working for either the developed or the developing world. It is neither sustainable nor desirable. It is based on a now obsolete and empty-world vision and it is leading us to disaster.

We need to accept that we live in a full-world context in which 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 former President George W. Bush has acknowledged, “addicted to oil,” consumption, and the conventional development model in general. An addictive substance is something one has developed a dependence upon that 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, untrammelled consumption, and the conventional development model. But, as any addict can tell you, “that ain’t easy.” In order to break an addiction of any kind, we must first clearly see the benefits of breaking it and the costs of remaining addicted. We must face the facts that accumulating studies like the Intergovernmental Panel on Climate Change reports, the Stern Review (2007), the Millennium Ecosystem Assessment (2005), 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:

A. Create and Share a New Vision of a Sustainable and Desirable Future

This imagined future will have zero fossil fuel use and a quality of life better than what exists today. It will involve understanding that GDP is a means to an end, not the end itself. Recognizing that in some countries today more GDP actually results in less human well-being (while in others the reverse is still true), it will require a focus on sustainable scale and *just* distribution. It will engender an entirely new and broader vision of what the economy is, what is its goal, and how it functions. Several efforts to do just this have occurred (cf., www.uvm.edu/giee/ESDA). But this effort needs to be ongoing and at multiple scales, from local to global. My colleagues and I are starting a new journal called *Solutions* (www.thesolutionsjournal.org) that will have as one of its goals the creation and sharing of this vision.

B. Develop New Measures of Progress

We should convene a new “Bretton Woods” conference to establish the new measures and institutions needed to replace GDP, the World Bank, the International Monetary Fund, and the World Trade Organization. At the time it was conceived, GDP was a useful signpost on the path to a better world, where increased economic activity provided jobs, income, and basic amenities to reduce worldwide social conflict and prevent a third world war. That economic activity has created a world very different from the one faced by the world leaders who convened at Bretton Woods in 1944. We are now living in a world overflowing with people and man-made capital, where the emphasis on growing GDP and economic activity is leading the world toward the brink of collapse. The international financial system is in crisis, partly as a result of overemphasis on material growth at all costs and a neglect of real and balanced development. Now the world is in need of new goals and new ways to measure progress towards those goals. There is a need for a global dialogue and consensus on these issues.

C. Shifting Primary National Policy Goals

We need to shift from the national policy goal of 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 then build real well-being in a balanced and sustainable way. The idea that economic growth—touted by the economic mainstream and especially the World Bank as the solution to *all* problems—had costs that could outweigh the benefits is an idea that is finally gaining broad support. Many institutions are now questioning the dominance of GDP growth as a primary policy goal and searching for alternatives.¹⁴ As described earlier, it is also clear from new research in psychology, neuroscience, sociology, and a range of other disciplines that “Quality of Life” is a complex phenomenon. It cannot be reduced to the formula that the more consumption of goods and services the better, as reliance on GDP as a policy goal would indicate. Quality of Life is the interaction of human needs and the subjective perception of their fulfillment, mediated by the opportunities available to meet those needs presented by the built, human, social, and natural capital assets of the system.¹⁵ New aggregate measures of Quality of Life are beginning to take this

complex relationship into account to turn economics from “the dismal science” into the “science of happiness.”¹⁶

D. Reforming Tax Systems

The system of taxation must be changed in order to encourage the right incentives by taxing negatives (pollution, depletion of natural capital, overconsumption) rather than positives (labor, savings, investment). The idea of taxing carbon emissions in some way is now firmly on the political agenda, even in the U.S.¹⁷ Bernow and colleagues proposed a reform of the tax system with the following elements:

- Levy taxes on air pollution (e.g., particulates, carbon dioxide, ozone precursors, and other noxious substances that are not effectively controlled).
- Rebate this revenue to the taxpayers in a way that would maintain a progressive tax structure.
- Phase in the tax shift gradually and predictably over a number of years to help ensure an orderly and low cost transition.
- Use a small portion of the tax revenues to provide transitional assistance for communities, workers, and pollution-intensive industries that are strongly affected by the tax and to support the development of clean technologies.
- Address the implications for international competitiveness of those industries that are most affected by the tax.¹⁸

Many of these elements are appearing in the carbon emission control ideas being proposed at both the national and international levels.¹⁹

E. Reforming International Trade

To promote well-being over mere GDP growth, international trade must be reformed. 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. The mainstream idea that “free” trade makes all parties better off, even though it ignores environmental and social externalities and other problems, has been contested for years. Achieving the theoretical benefits from international trade depends on several assumptions

about the nature of international markets and other institutions that simply do not hold. These assumptions are predicated on: (1) no externalities, (2) stable prices, (3) equally dynamic comparative advantages, (4) no coercion in production or exchange, and (5) no international mobility of capital. The current system lies very far from matching *any* of these conditions, but especially numbers 1 and 5. To actually make trade mutually beneficial and sustainable, the burden of proof should be shifted to the parties engaged in the trading. It is their responsibility to demonstrate that adequate steps have been taken to ensure that the conditions for sustainable trade are actually met as a *precondition* for trade.²⁰

F. Expanding the Commons Sector

We need to greatly expand the commons sector of the economy, which would be responsible for managing existing common assets and creating new ones. Some assets should be held in common because it is more just. This group includes resources created by nature or by society as a whole. Others should be held in common because it is more efficient. This group includes non-rival resources for which price rationing creates artificial shortages (i.e., information) or rival resources that generate non-rival benefits, such as ecosystem structure (i.e., forests). Some assets should be held in common because it is more sustainable. This group includes essential common pool resources and public goods.

Peter Barnes suggests common asset trusts at various scales for expanding and managing the sector.²¹ Trusts can "proptertize" the commons without privatizing them. The Alaska Permanent Fund and regional land trusts are existing examples. A proposed initiative aimed at massively reducing global carbon emissions and at the same time reducing poverty is the "Earth Atmospheric Trust."²² The system would include six basic elements:

- (1) A global cap-and-trade system for all greenhouse gas emissions. A cap-and-trade system is preferable to a tax, because caps set quantity (the ultimate goal) and allow price to vary; taxes set price and allow quantity to vary.
- (2) Auctioning off *all* emission permits before allowing trading among permit holders. This essential feature will send the right price signals to emitters.

- (3) Reducing the cap over time to stabilize concentrations of greenhouse gases in the atmosphere at a level equivalent to 350 parts per million of carbon dioxide.
- (4) Depositing all the revenues into an Earth Atmospheric Trust, transparently administered by elected trustees serving long terms and provided with a clear mandate to protect Earth's climate system and atmosphere for the benefit of current and future generations.
- (5) Returning a fraction of the revenues derived from auctioning permits to all people on Earth in the form of a per capita payment.
- (6) Use of the remainder of the revenues to enhance and restore the atmospheric asset, to invest in both social and technological innovations, to assist developing countries, and to administer the Trust.

VII. Conclusions

Changes in our current interconnected worldviews, institutions, and technologies are necessary in order to achieve a lifestyle better adapted to our new full-world context. To a certain extent, we can design the future we want by creating a new vision and new goals. If our societal goals shift from maximizing growth of the market economy to maximizing sustainable human well-being, then different institutions will better serve these goals. It is also important to recognize, however, that a transition will occur in any case, and that it will almost certainly be driven by crises. Whether these crises lead to decline or collapse followed by ultimate rebuilding, or to a relatively smooth transition to a sustainable and desirable future, depends on our ability to anticipate the required changes and to develop a new culture and new institutions.

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 and it will require a new vision, new measures, and new institutions. It will require a directed evolution of our entire society.²³ Yet, it is not a sacrifice of our quality of life to break this addiction. Quite the contrary, it is a sacrifice not to. ●

Notes

1. Rockstrom et al. 2009.
2. Soddy 1933.
3. Costanza et al. 2008.

4. Kasser 2003.
5. Easterlin 2005.
6. Layard 2005.
7. Frank 2000.
8. Costanza et al. 1997.
9. ISEW, Daly and Cobb 1989.
10. Cobb et al. 1995.
11. Frank 2007.
12. Prugh et al. 2000.
13. Costanza et al. 1998.
14. c.f., Costanza et al. 2009.
15. Costanza et al. 2008.
16. Layard 2005.
17. Cap and auction systems, within which permits are sold upstream (at the point where greenhouse gas emitting products enter the economy) are similar in effect to a tax, the major difference being that a cap sets the quantity and allows the price to vary, while a tax sets the price and allows the quantity to vary.
18. Bernow et al. 1998.
19. c.f., Barnes et al. 2008.
20. Costanza et al. 1995.
21. Barnes 2006.
22. Barnes et al. 2008.
23. Beddoe et al. 2009.

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