

THE PARDEE PAPERS / No. 4 / January 2009

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Boston University The Frederick S. Pardee Center
for the Study of the Longer-Range Future



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Beyond GDP: The Need for New Measures of Progress

Robert Costanza, Maureen Hart, Stephen Posner, and John Talberth

Abstract

This paper is a call for better indicators of human well-being in nations around the world. We critique the inappropriate use of Gross Domestic Product (GDP) as a measure of national well-being, something for which it was never designed. We also question the idea that economic growth is always synonymous with improved well-being. Useful measures of progress and well-being must be measures of the degree to which society's goals (i.e., to sustainably provide basic human needs for food, shelter, freedom, participation, etc.) are met, rather than measures of the mere volume of marketed economic activity, which is only one means to that end. Various alternatives and complements to GDP are discussed in terms of their motives, objectives, and limitations. Some of these are revised measures of economic activity while others measure changes in community capital—natural, social, human, and built—in an attempt to measure the extent to which development is using up the principle of community capital rather than living off its interest. We conclude that much useful work has been done; many of the alternative indicators have been used successfully in various levels of community planning. But the continued misuse of GDP as a measure of well-being necessitates an immediate, aggressive, and ongoing campaign to change the indicators that decision makers are using to guide policies and evaluate progress. We need indicators that promote truly sustainable development—development that improves the quality of human life while living within the carrying capacity of the supporting ecosystems. We end with a call for consensus on appropriate new measures of progress toward this new social goal.

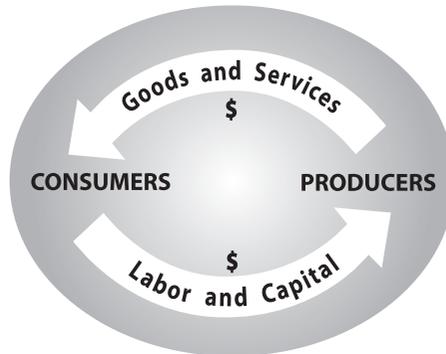
In addition to all those whose work is mentioned in this paper and the two anonymous reviewers, the authors would like to acknowledge Bill Becker and the President's Climate Action Project (PCAP) since at least one strand of the idea for this paper came out of the PCAP's National Leadership Summits for a Sustainable America. We would also like to thank the Johnson Foundation for hosting the Summits at its Wingspread facility, the Suzuki Foundation for its encouragement of our work on this paper, and the National Science Foundation for graduate research assistant support.

HOW GDP MEASURES ECONOMIC PROGRESS

For more than a half century, the most widely accepted measure of a country's economic progress has been changes in its Gross Domestic Product (GDP).¹ GDP is an estimate of market throughput, adding together the value of all final goods and services that are produced and traded for money within a given period of time. It is typically measured by adding together a nation's personal consumption expenditures (payments by households for goods and services), government expenditures (public spending on the provision of goods and services, infrastructure, debt payments, etc.), net exports (the value of a country's exports minus the value of imports), and net capital formation (the increase in value of a nation's total stock of monetized capital goods).

Figure 1 shows a simple representation of the circular flow of income and expenditures within a market economy: individuals, businesses, and governments use capital to create goods and services. In essence, GDP measures the annual volume of this flow (or throughput) in an economy, similar to an electric meter measuring energy use in a building.

Figure 1: Traditional View of Economic Activity



© M. Hart, *Sustainable Measures*

1. The Gross National Product (GNP) is another frequently mentioned measure of economic progress. The difference between GDP and GNP is the production boundaries used. GDP measures all goods and services produced in the country whether by domestic or foreign companies. It excludes goods and services produced in other countries. GNP measures all production by domestic companies regardless of where in the world that production takes place. Because its boundaries coincide with the boundaries used to measure a country's population and employment, GDP is more useful for setting domestic policies and evaluating programs. To simplify the discussion in this document, the term GDP will be used throughout this paper to refer to the measure of economic activity although at times in the past, the actual measure used was GNP.

GDP is based on estimates and survey data maintained in a country's System of National Accounts (SNA). These consist of detailed economic census data collected at regular intervals. Annual and quarterly GDP estimates are extrapolated from the census data combined with annual economic survey data such as retail sales, housing starts, and manufacturer shipments (Marcus and Kane 2007).

GDP measures the flow of goods and services produced within the market (goods and services publicly traded for money). Some 'nonmarket' production is included in GDP, such as defense spending by the federal government and nonprofit spending on emergency housing and health care. But many important economic activities are entirely excluded from GDP measurements, such as volunteer work, social capital formation within healthy family units, the costs of crime and an increasing prison population, and the depletion of natural resources.

Since its creation, economists who are familiar with GDP and SNA methodology have emphasized that GDP is a measure of economic activity, not economic well-being. In 1934, Simon Kuznets, the chief architect of the United States national accounting system, cautioned against equating GDP growth with economic or social well-being. The US Bureau of Economic Analysis' description of GDP states the purpose of measuring GDP is to answer questions such as "how fast is the economy growing," "what is the pattern of spending on goods and services," "what percent of the increase in production is due to inflation," and "how much of the income produced is being used for consumption as opposed to investment or savings" (McCulla and Smith 2007). To understand how GDP continues to be misused as a scorecard for national well-being, it is important to consider how the current system has evolved. It is also important to recognize that GDP is not inherently bad—it measures what it measures. Rather it is being misused as an indicator of something it doesn't measure and was never intended to measure.

A BRIEF HISTORY OF GDP

When GDP and SNA methodologies were initially developed in the US and UK² in the 1930s and 1940s, the world was in the midst of major social and economic upheaval from two global wars and the Great Depression. President Roosevelt's government used the statistics to justify policies and budgets aimed at bringing the US out of the depression. As it became more likely that the US would become involved in World War II (WWII), there was a concern about whether this would jeopardize the standard of living of US citizens who were just beginning to recover from the depression. GDP estimates were used to show that the economy could provide sufficient supplies for fighting WWII while maintaining adequate production of consumer goods and services (Marcuss and Kane 2007).

The use of GDP globally as a measure of economic progress was further strengthened as a result of the Bretton Woods Conference. A key factor in the outbreak of WWII was economic instability in a number of countries caused by unstable currency exchange rates and discriminatory trade practices that discouraged international trade. In 1944, in order to avoid a recurrence of such instability, leaders of the 44 allied nations gathered in Bretton Woods, New Hampshire, to create a process for international cooperation on trade and currency exchange. The intent of the meeting was to “speed economic progress everywhere, aid political stability and foster peace” (IBIBLIO/AIS 1946). International trade would create jobs in all countries. Those jobs would provide income that would allow people everywhere to obtain adequate food, housing, medical care, and other amenities. Improving economic well-being was thus key to creating lasting world peace. Growing the economy was seen as the path to economic well-being.

The key outcomes of the meeting were the establishment of the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD—now part of the World Bank). The IMF was created as a forum for collaborative management of international monetary exchange and for stabilization of the exchange rates of countries' currencies.

2. Work by the US and UK Treasuries in the 1930s and 1940s was the foundation of GDP methodologies. Since then the work has been expanded on by many nations and has been formalized in the System of National Accounts. 1993 documentation available at <http://unstats.un.org/unsd/nationalaccount/>

The World Bank was established to provide investment funds for infrastructure reconstruction and development in war-torn areas and less developed nations in areas such as Latin America. In theory, the governing structures of these institutions were supposed to provide an equal voice to all member countries. In practice, because of its political and economic strength following WWII, the US dominated both institutions for the first quarter century. As a result, the US dollar, economy, and economic policies became the de facto standards against which other countries were compared. In addition, the work done by the US and UK Treasuries developing GDP methodologies for analyzing economic activity informed much of the discussion at the Bretton Woods meeting. Thus GDP came to be used by the IMF and the World Bank as the primary measure of economic progress in the ensuing 60 years. With the restructuring of these institutions in the 1970s, the US has had a less dominant position within the World Bank and the IMF; however, GDP remains the most widely used measure of economic progress.

Economists have warned since its introduction that GDP is a *specialized* tool, and treating it as an indicator of general well-being is inaccurate and dangerous. However, over the last 70 years economic growth—measured by GDP—has become the *sine qua non* for economic progress. Per capita GDP is frequently used to compare quality of life in different countries. Governments often use changes in GDP as an indicator of the success of economic and fiscal policies. In the US, GDP is “one of the most comprehensive and closely watched economic

Economists have warned since its introduction that GDP is a *specialized* tool, and treating it as an indicator of general well-being is inaccurate and dangerous. However, over the last 70 years economic growth—measured by GDP—has become the *sine qua non* for economic progress.

statistics: it is used by the White House and Congress to prepare the Federal budget, by the Federal Reserve to formulate monetary policy, by Wall Street as an indicator of economic activity, and by the business community to prepare forecasts of economic performance that provide the basis for production, investment, and employment

planning” (McCulla and Smith 2007,1). Internationally, changes in a country’s GDP are used by both the IMF and the World Bank to guide policies and determine how and which projects are funded around the world.

Today GDP in particular and economic growth in general is regularly referred to by leading economists, politicians, top-level decision-makers, and the media *as though* it represents overall progress. In fact, a report recently released by the World Bank says that nothing besides long-term high rates of GDP growth (specifically, a doubling of GDP each decade) can solve the world's poverty problem (Commission on Growth and Development 2008). This is like measuring a building's energy use and saying that the more electricity, the better the quality of life for the building's inhabitants. Although electricity powers some of life's amenities, a higher electric bill, as many people are beginning to find out, does not equate to a better life.

GDP measures everything “...except that which makes life worthwhile.”

“Our Gross National Product...counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for the people who break them. It counts the destruction of the redwood and the loss of our natural wonder in chaotic sprawl. It counts napalm and counts nuclear warheads and armored cars for the police to fight the riots in our cities..., and the television programs which glorify violence in order to sell toys to our children. Yet the Gross National Product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything, in short, except that which makes life worthwhile. And it can tell us everything about America except why we are proud that we are Americans.”

Robert F. Kennedy, speech at the University of Kansas, March 18, 1968

PROBLEMS WITH USING GDP TO MEASURE QUALITY OF LIFE AND ECONOMIC PROGRESS

In presenting the GDP to Congress in 1934, Simon Kuznets discussed its uses and limits. After presenting an itemized list of the things measured by the GDP, Kuznets noted, “The boundaries of a “nation” in “national” income are still to be defined; and a number of other services, in addition to those listed above, might also be considered a proper part of the national economy's end-product.” He went on to list “services of housewives and other members of the family,” “relief and charity,” “services of owned durable goods,” “earnings from odd jobs,” and “earnings from illegal pursuits” among others (Kuznets 1934, 3–5). His stated reasons for excluding these

things from the GDP are several, but largely boil down to his intent that the GDP be a precise and above all a specialized tool, designed to measure only a narrow segment of society's activity. This is reflected in his fear that the simplicity of the GDP makes it prone to misuse:

“The valuable capacity of the human mind to simplify a complex situation in a compact characterization becomes dangerous when not controlled in terms of definitely stated criteria. With quantitative measurements especially, the definiteness of the result suggests, often misleadingly, a precision and simplicity in the outlines of the object measured. Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the center of conflict of opposing social groups where the effectiveness of an argument is often contingent upon oversimplification” (Kuznets 1934, 5–6).

Because GDP measures only monetary transactions related to the production of goods and services, it is based on an incomplete picture of the system within which the human economy operates. A more complete picture of how the human economic system fits within the social and environmental systems upon which it depends is shown in Figure 2.

Figure 2: View of Economy as Part of a Larger System

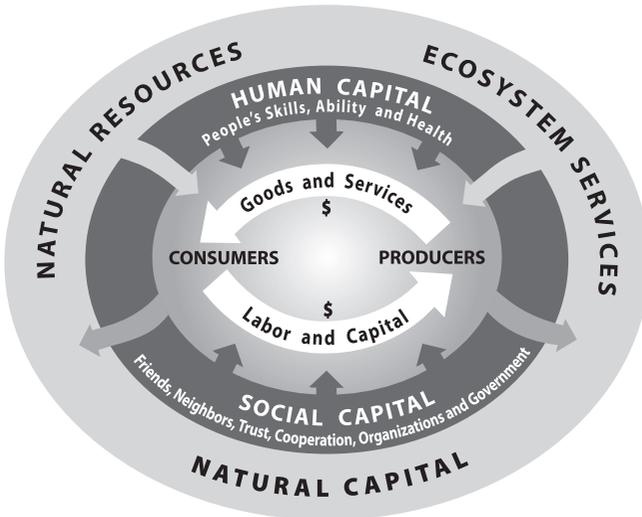


Figure 2 shows that the economy draws benefits from natural, social, and human capital and that the quantity and quality of such capital, in turn, is affected by net investment from the economy. By measuring only marketed economic activity (the inner circle), GDP ignores changes in the natural, social, and human components of community capital on which the community relies for continued existence and well-being. As a result, GDP not only fails to measure key aspects of quality of life; in many ways, it encourages activities that are counter to long-term community well-being.

Of particular concern is that GDP measurement encourages the depletion of natural resources faster than they can renew themselves. Another concern is that current economic activity is degrading ecosystems, thereby reducing the services that, until now, have been provided to humans virtually for free. For example, in 1997 it was estimated that the world's ecosystems provided benefits valued at an average of US\$33 trillion per year. This was significantly larger than the total *global* GDP at the time (Costanza, d'Arge et al. 1997). GDP encourages depletion because clear-cutting a forest for lumber is valued more in GDP terms than the ecosystem services that forest provides if left uncut. These services—including biodiversity habitat, reducing flooding from severe storms, filtration to improve water quality in rivers and lakes, and the sequestration of carbon dioxide and manufacture of oxygen—are not part of the market economy and as a result are not counted in GDP. As Herman Daly, formerly the senior economist at the World Bank, once commented, “the current national accounting system treats the earth as a business in liquidation” (cited in Cobb, Halstead et al. 1995).

Another concern that has been raised about GDP as a measure of progress is the ‘threshold effect.’ As GDP increases, overall quality of life often increases up to a point. Beyond this point, increases in GDP are offset by the costs associated with increasing income inequality, loss of leisure time, and natural capital depletion (Max-Neef 1995; Talberth, Cobb et al. 2007). An increasingly large and robust body of research confirms that, beyond a certain threshold, further increases in material well-being have the negative side-effects of lowering community cohesion, healthy relationships, knowledge, wisdom, a sense of purpose, connection with nature, and other dimensions of human happiness. In fact, a strikingly consistent global trend suggests that as material affluence increases, these critical components of psychic

income often decline amidst rising rates of alcoholism, suicide, depression, poor health, crime, divorce, and other social pathologies. In his recent book *Deep Economy*, author Bill McKibben provides an excellent overview of findings from this emerging field (McKibben 2007).

In addition, GDP conceals a growing disparity between the haves and have-nots. An article by Anna Bernasek (*The New York Times*, June 25,

A number of ways of measuring national-level progress have been proposed, developed, and used to address this growing realization that GDP is a measure of economic *quantity*, not economic *quality* or welfare, let alone social or environmental well-being. The measures also address the concern that GDP's emphasis on quantity encourages depletion of social and natural capital and other policies that undermine quality of life for future generations.

2006) discusses the links between income disparity and poorer overall health in a country, decreased worker productivity, and increased social unrest. "A highly unequal distribution of income can be detrimental to economic welfare by increasing crime, reducing worker productivity, and reducing investment. Moreover, when growth is concentrated in the wealthiest income brackets it counts less towards improving overall economic welfare because the social benefits of increases in

conspicuous consumption by the wealthy are less beneficial than increases in spending by those least well off" (Talberth, Cobb et al. 2007).

OTHER WAYS TO MEASURE PROGRESS

A number of ways of measuring national-level progress have been proposed, developed, and used to address this growing realization that GDP is a measure of economic *quantity*, not economic *quality* or welfare, let alone social or environmental well-being. The measures also address the concern that GDP's emphasis on quantity encourages depletion of social and natural capital and other policies that undermine quality of life for future generations. In general, these new measures can be categorized as: (1) indexes that address the issues described above by making 'corrections' to existing GDP and SNA accounts; (2) indexes that measure aspects of well-being directly;

(3) composite indexes that combine approaches; and (4) indicator suites. Like GDP, all these measures are abstracted indicators showing a view from 30,000 feet, not comprehensive reports on the heart and soul of individual communities. However, some can and are being used to inform local and regional decisions. This is an improvement on the misuse of GDP and economic growth as a proxy for well-being.

An ongoing debate within the indicators community is whether GDP should be improved on, replaced by these other approaches, or supplemented. A case can be made for relying on measures that improve GDP because it would be rather straightforward to rearrange the accounting protocols to recognize that some expenditures now counted as beneficial should actually be counted as harmful or defensive in nature. The case for replacing GDP altogether rests on the fact that GDP is not, in fact, a true measure of welfare and was never meant to serve that purpose at all. Advocates for supplementing GDP with these other measures point out that GDP, while a poor measure of welfare, nonetheless “serves crucial and helpful roles in macroeconomic policy” and is “unique in that it combines simplicity, linearity, and universality as well as carries the objectivity of the observable market price as its guiding principle” (Goossens, Mäkipää et al. 2007, 60). Below we consider some of the candidates. This is not a comprehensive list, but simply some of the better-known examples.

INDEXES THAT ‘CORRECT’ GDP

Some alternative indicators of economic well-being use the national accounts and GDP as the foundation and then add or subtract quantities in an attempt to address some of the issues discussed above. These include the Index of Sustainable Economic Welfare, the Genuine Progress Indicator, Green GDPs, and Genuine Wealth. Because these measures are based on much of the same economic data as GDP, these measures still have limitations, including:

- Lack of consensus on how to value items that are not regularly reported in monetary terms (e.g., volunteer labor or illegal activities);

- Subjectivity in deciding which expenses are beneficial and therefore should be added to the total and which are detrimental and therefore need to be subtracted (i.e., junk food and home security systems); and
- Lack of consensus on how to quantify the costs of depleting natural resources.

However, applications of these new accounting systems provide compelling evidence of a widening gap between GDP and true economic well-being, indicating that, over time, more and more economic activity may be self-canceling from a welfare perspective (Max-Neef 1995).

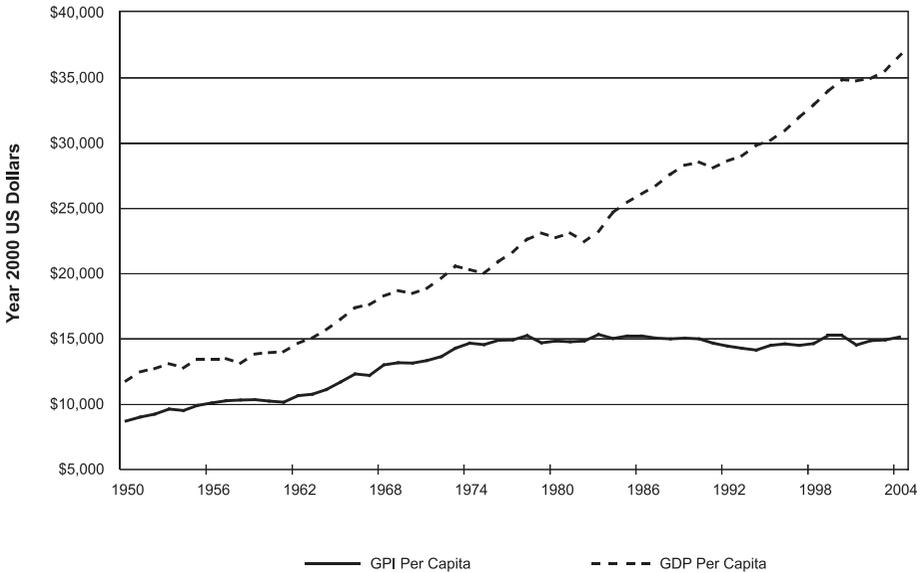
Index of Sustainable Economic Welfare/ Genuine Progress Indicator

The Index of Sustainable Economic Welfare (ISEW), later revised and re-named the Genuine Progress Indicator (GPI), is a measure that uses GDP as a foundation. It was first proposed in 1989 by Daly and Cobb in their book *For the Common Good* as “a way of measuring the economy that will give better guidance than the GNP to those interested in promoting economic welfare” (Daly and Cobb 1989, 401). In developing the ISEW, the authors built on work by Zolotas on the Index of Economic Aspects of Welfare (EAW) and Nordhaus and Tobin’s Measure of Economic Wealth (MEW). In particular Daly and Cobb wanted an index that accounted for both current environmental issues and long-term sustainable use of natural ecosystems and resources. In 1995, a group called Redefining Progress issued a revised methodology and changed the name of the measure to the Genuine Progress Indicator (GPI).

While GDP is a measure of current income, GPI is designed to measure the sustainability of that income, essentially measuring whether progress is a result of living off the interest of community capital or spending it down. “Both the GPI and ISEW use the same personal consumption data as GDP but make deductions to account for income inequality and costs of crime, environmental degradation, and loss of leisure and additions to account for the services from consumer durables and public infrastructure as well as the benefits of volunteering and housework. By differentiating between

economic activity that *diminishes* both natural and social capital and activity that *enhances* such capital, the GPI and its variants are designed to measure sustainable economic welfare rather than economic activity alone” (Talberth, Cobb et al. 2007, emphasis added).

Figure 3: Real GDP and GPI Per Capita 1950–2004



Source: Talberth, Cobb, et al. 2007.

Figure 3 shows the trend in GDP and GPI for the US from 1950 to 2004. Despite steady growth in GDP, the US economy, measured by GPI, has actually stagnated since the late 1970s as income inequality, environmental degradation, and the US’s failing international position take their toll on real economic progress (Talberth, Cobb et al. 2007).

Green GDP

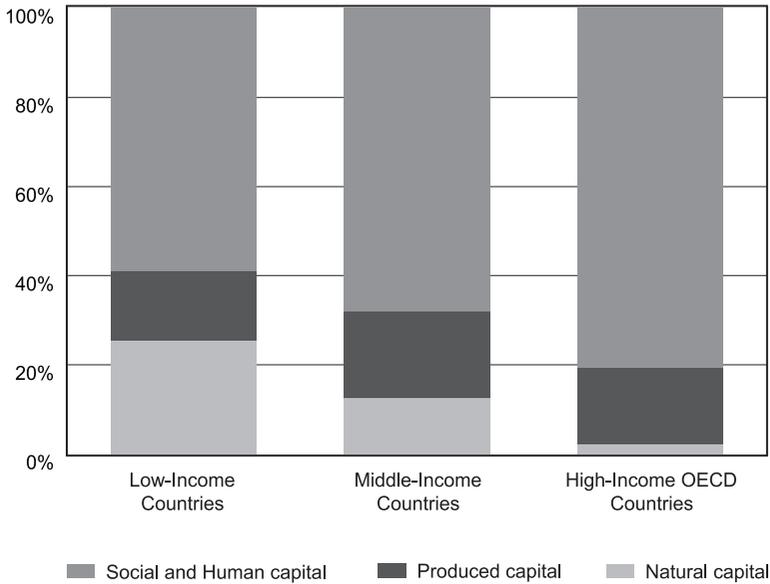
Numerous attempts have been made to develop Green GDPs—GDPs that factor estimates for environmental degradation and depletion of natural resources into the national income accounts to arrive at a single number. Work on a Green GDP for Japan in the 1980s informed the Daly and Cobb efforts on the ISEW. Green GDP calculations also have been developed for

countries as diverse as Australia, Canada, China, Costa Rica, Indonesia, Mexico, Papua New Guinea, and the US, although none of these efforts have resulted in regular reporting of the results. The recent efforts by China to measure and report on a Green GDP are described below in the section on barriers.

Genuine Savings

Genuine Savings (GS) was developed for the World Bank (World Bank 1997) and is defined as “the true level of saving in a country after depreciation of produced capital; investments in human capital (as measured by education expenditures); depletion of minerals, energy, and forests; and damages from local and global air pollutants are taken into account” (Hamilton, Ruta et al. 2006, xv). This includes the value of global damages from carbon emissions. GS measures the built, natural, and intangible capital that is required for human society to exist and to thrive. Intangible wealth is related to the social and human capital of a nation and includes skills and know-how of the labor force, trust and cooperation/collaboration, efficient judicial systems, clear property rights, and effective government. Like the GPI, the national income accounts are the underpinnings of GS. The calculation subtracts amounts for environmental degradation and resource depletion and adds in amounts for investments in human capital. GS attempts to measure sustainable use of resources although it does not take into account equity issues related to consumption. The GS has been calculated for 120 countries. One significant finding detailed in the World Bank’s 2006 report *Where is the Wealth of Nations? Measuring Capital for the 21st Century* is that increased wealth in a country is primarily the result of an increase in intangible wealth—human capital and the formal and informal institutions that humans create. As shown in Figure 4, 25 percent of the wealth of poor countries is natural capital—this percentage declines as a country gets wealthier because high income countries have a larger percentage of wealth in intangibles (human and social capital). One conclusion from this is that, especially for the poorest nations, increasing economic activity by selling off natural resources actually results in lower welfare in the long run.

Figure 4: Percent of Wealth



Source: Hamilton, Ruta et al. 2006.

INDEXES THAT DO NOT USE GDP

Some alternative indexes do not measure economic activity; rather, they measure environmental or social activities, well-being, or changes in environmental, social, or human capital.

Ecological Footprint

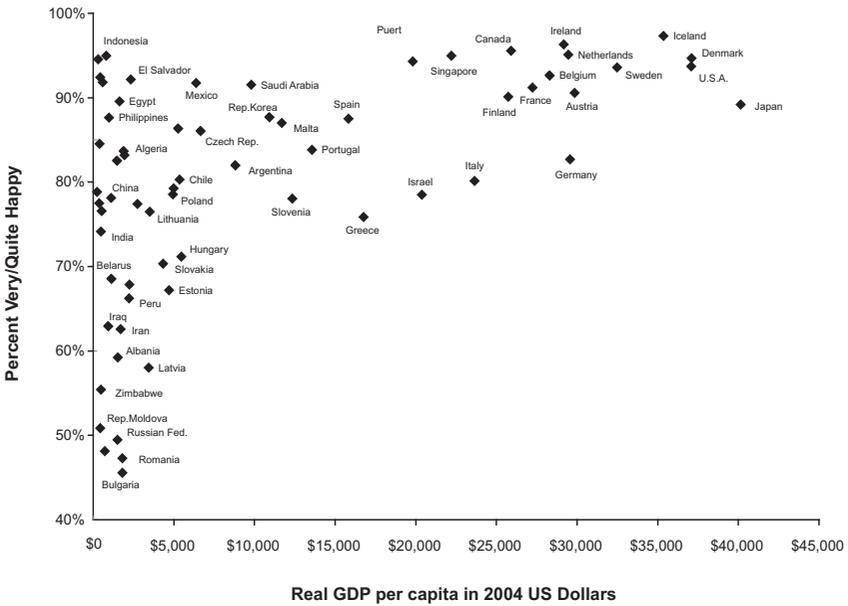
The Ecological Footprint (EF) was developed by Mathis Wackernagel and William Rees as a way to account for flows of energy and matter into and out of the human economy and convert those flows into a measure of the area of productive land and water required to support those flows (Wackernagel and Rees 1996). The EF is intended to be used as a resource management tool for assessing whether and to what extent an individual, city, or nation is using available ecological assets faster than the supporting ecosystems can regenerate those assets. Most recent estimates show that humanity's Ecological Footprint is 23 to 40 percent larger than renewable rates; how-

ever, the vast majority of this overshoot is attributable to carbon emissions and not mismanagement of terrestrial or aquatic biomes (Venetoulis and Talberth 2006). Future improvements to footprint methods will remedy EF's current inability to distinguish between sustainable and unsustainable use of these biomes. The EF has been used as a stand-alone index of environmental sustainability and is also used as part of composite indicators described below. Over the last 12 years, EFs have been calculated for most nations and for numerous subnational regions.

Subjective Well-Being

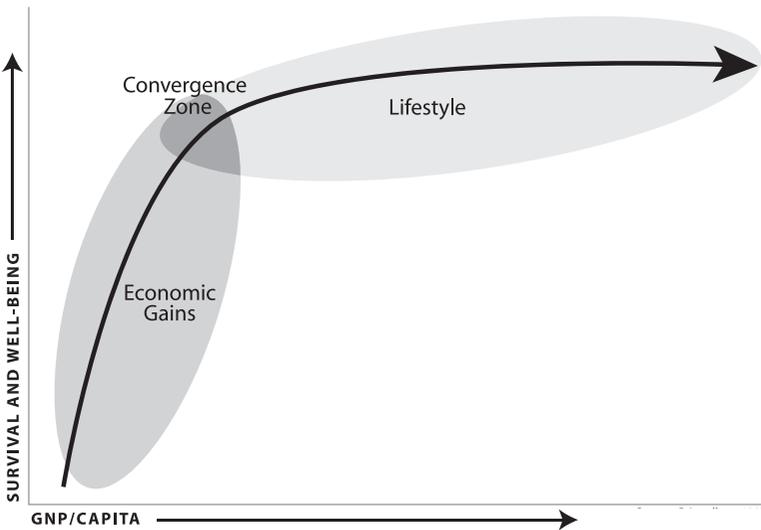
Over the last two decades, there has been a growing body of work that evaluates human well-being based on self-reporting by individuals and groups. Generally referred to as measures of subjective well-being (SWB), these studies attempt to measure "satisfaction" with quality of life or people's moods and emotions (Diener and Suh 1999). The intent is to measure the extent to which human needs are actually being met. Because these measures are based on the judgments of the survey respondents rather than on more easily quantifiable inputs of money and material goods, there are concerns that these "subjective" measures are not factually based and therefore less valid than "objective" measures like GDP. However, as pointed out by Costanza and others, objective measures such as life expectancy, rates of disease, and GDP are only proxies for well-being that have been identified through the subjective judgment of decision-makers; "hence the distinction between objective and subjective indicators is somewhat illusory" (Costanza, Fisher et al. 2007, 268). There is also a concern that there are cultural differences that make it difficult to compare the results across different ethnic, gender, age, religion, and other cultural boundaries. As Figure 5 shows, comparisons of reported well-being and per capita GDP have shown that beyond a certain income level, happiness does not increase significantly with additional income. Figure 6 illustrates the trend in which economic gains beyond the threshold no longer correlate with increases in well-being (Inglehart 1997). The World Database of Happiness is a compilation of studies and data related to happiness and satisfaction surveys (Veenhoven 2008).

Figure 5: Percent Very/Quite Happy vs. GDP



Sources: World Values Surveys; GDP per capita from United Nations Statistics Division—National Accounts. Nominal-Real GDP adjustments made with Consumer Price Index annual averages from US Bureau of Labor Statistics.

Figure 6: GNP Versus Well-Being



Source: Inglehart 1997.

Gross National Happiness

Gross National Happiness (GNH) is frequently mentioned as an alternative measure of progress. It was originally suggested by the King of Bhutan in the early 1980s as a more appropriate measure for his small kingdom than GDP. It was not an actual index, but a principle for guiding Bhutanese development in a fashion consistent with the country's culture and spiritual values rather than by focusing on increasing economic activity. Since 2004, the Bhutan government has sponsored four international conferences on GNH. Bhutan has established a Gross National Happiness Commission but a specific methodology for measuring GNH has not yet been defined (Ura and Galay 2004).

COMPOSITE INDEXES INCLUDING GDP

All of the alternatives to GDP (and GDP itself) are composite indexes that combine several different measures into a single number. Here we list some indexes that combine GDP or GDP variants with some of the non-GDP environmental or social indexes already described or with other measures of well-being.

Human Development Index

Since 1990, the United Nations Development Program has used the Human Development Index (HDI) in its annual Human Development Report. The purpose of the report is to show how well the management of economic growth and human development is actually improving human well-being in the nations of the world. The inaugural report defines human development as the "process of enlarging people's choices...to live a long and healthy life, to be educated, have access to resources needed for a decent standard of living,...[to have] political freedom, guaranteed human rights and personal self-respect." However, the authors acknowledge the difficulty of quantifying the last three components, and the index focuses on "longevity, knowledge and decent living standards" as proxies for people's ability to live long and prosperous lives (UN Development Program 1990).

- Longevity is measured using life expectancy at birth. This also serves as a proxy for other aspects of well-being such as adequate nutrition and good health.
- Knowledge is measured using literacy rate and school enrollment, which are intended to reflect the level of knowledge of the adult population as well as the investment in the youth.
- Access to a decent standard of living is measured using GDP adjusted to reflect purchasing power parity and the threshold effect using a logarithm of real GDP per capita.

Initially reported for 14 countries, the UN's 2007 report presented HDI results for 177 countries (UN Development Program 2007).

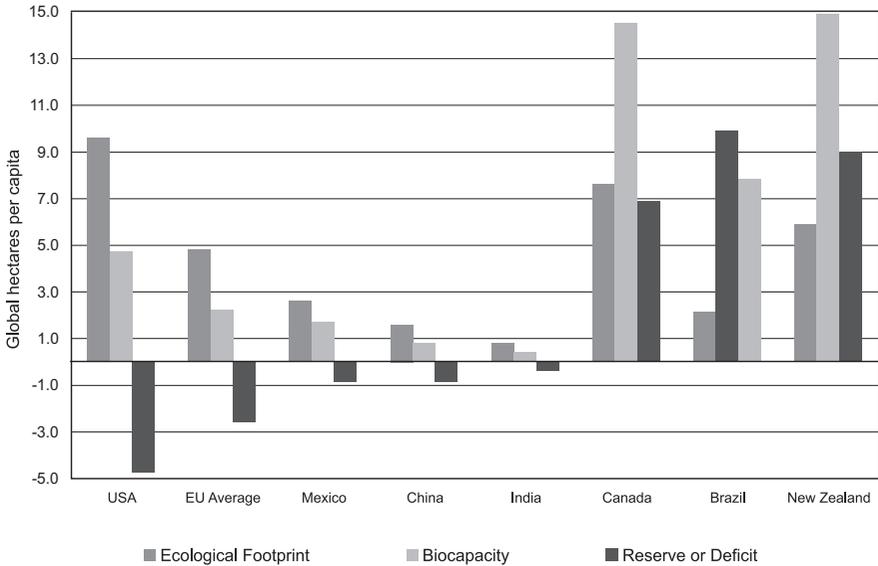
Living Planet Report

Along with several partner agencies, in 1998, the World Wide Fund for Nature (WWF, formerly the World Wildlife Fund) published the first Living Planet Report. The report has two components: the state of the world's natural environment and the burden placed on the natural environment by humanity. The Living Planet Index (LPI) is a measure of the world's forests, freshwater and marine ecosystems, specifically on the "extent and severity of biodiversity loss" (Hails 2006). The LPI tracks biodiversity trends by tracking the populations of 1,313 species of fish, amphibians, reptiles, birds, and mammals. In the initial reports, the Global Consumption Pressure—a measure of six subcomponents of human-related consumption of grain, marine fish, wood, cement, carbon dioxide emissions, and water withdrawals—was the measure of the human burden on the environment (Loh, Randers et al. 1998). Since 2002, the Ecological Footprint has been used as the measure of human consumption and waste generation. The 2006 Living Planet Report (LPR) showed that human use of the earth's biocapacity is exceeding the regenerative capacity by 25 percent.³ Figure 7 compares selected countries' biocapacities with their ecological footprints on a per capita basis using

3. Using a different method for factoring carbon emissions and the needs of other species, Redefining Progress estimated the degree of overshoot to be 40% (Venetoulis, J. and John Talberth. 2007. Refining the Ecological Footprint. *Environment, Development, and Sustainability* 10: 441–469).

the LPR estimates. Some countries like Brazil and Canada have a positive reserve because of their vast land areas, relatively small populations, and per capita use below the regeneration rate. However, most countries in the world are operating at a loss in terms of biocapacity.

**Figure 7: Living Planet Index
Ecological Reserve/Deficit for Selected Countries**



Source: *Living Planet Report 2006*.

Happy Planet Index

The purpose of the Happy Planet Index (HPI), developed and published by the New Economics Foundation (NEF), is to measure a country's ecological efficiency in delivering human well-being. The index is a composite of three measures: life expectancy at birth, life satisfaction, and ecological footprint. The 2006 report by NEF shows the results for 178 countries using a color coding scheme that depicts graphically not only how a country rates on the HPI scale but also how the three components affected the rating. Countries can also have similar life satisfaction measures but different overall results. For example, although people in the US and New Zealand report similar levels of life satisfaction, New Zealand's overall HPI is 13 points higher than the US' because the average New Zealander has a slightly higher life expect-

tancy and uses only half the resources of the average US citizen as measured by their respective Ecological Footprints (Marks, Abdallah et al. 2006).

An interesting result of comparing the HPI and HDI methodologies is that two countries can have very similar results for the HDI but have very different results of HPI. For example, Honduras's HPI is 30 points higher than Moldova even though the two countries have similar HDI ratings, ecological footprint and life expectancy. The reason is that the Life Satisfaction in Honduras is more than double that of people in Moldova.

INDICATOR SUITES

All of the indicators mentioned so far, including GDP, are based on the aggregation of a large number of variables into a composite index. Many new measures of progress do not attempt this final aggregation step, but simply report many indicators separately. These systems leave the final aggregation step, which answers the question: "what does this all mean?" to the user. There are a very large number of these indicator suites in use at a variety of scales from municipal to national. For example, the UN Division for Sustainable Development lists on its website a large set of indicators, along with guidelines and methodologies (UN DESA 2009). Here we mention only a few of the more relevant examples.

National Income Satellite Accounts

One problem with developing Green GDP methodologies is that the Systems of National Accounts (SNA) on which GDP is based use exclusively monetary transactions to establish values for items. As a result, natural resources and ecosystem services, which are not traded in markets, are left out. Rather than estimating "shadow" values for these items and including them directly in the SNA, another method that has been used is the creation of supplemental or "satellite" accounts, some of which are reported in physical units. In 2003, the *Handbook of National Accounting: Integrated Environmental and Economic Accounting* was published jointly by the United Nations, International Monetary Fund (IMF), the Organization of Economic Cooperation and Development (OECD), the Statistical Office of the European Communities (Eurostat) and the World Bank, as guidance for this

process. They list four categories of satellite accounts to augment the SNA:

- Flow accounts that provide information at the industry level about the use of energy and materials as inputs and the generation of pollutants and solid waste;
- Expenditure accounts that show the amount of money spent by industry, government, and households to protect the environment or manage natural resources;
- Natural resource asset accounts that measure quantities of natural resources such as land, fish, forest, water, and minerals; and
- Accounts of the non-market flow and environmentally adjusted aggregates to show how non-market items are valued and adjusted for natural resource depletion and degradation.

The Handbook of National Accounting satellite accounts do not include social and human capital components. But other efforts to produce satellite accounts are looking at components such as health, education, volunteer activity, and household production. In general, producing satellite accounts is a way to put additional information “on the table,” but avoids the difficult task of fully integrating such information into the existing SNA.

Calvert-Henderson Quality of Life Indicators

The Calvert-Henderson Quality of Life Indicators were developed as a collaborative effort between the socially responsible investment firm, Calvert Group, economist and futurist Hazel Henderson, and a multi-disciplinary group of practitioners and scholars from government agencies, for-profit firms, and nonprofit organizations. The indicators, the result of an extensive six-year study, cover 12 issue areas: education, economy, energy, environment, health, human rights, income, infrastructure, national security, public safety, recreation, and shelter. The indicators were developed as a suite rather than as a composite, leaving overall interpretation to the user. They were published in a report in 2000 and have been maintained online since then at www.calvert-henderson.com (Henderson, Lickerman et al. 2000).

Millennium Development Goals and Indicators

In 2000, leaders of 189 countries signed the United Nations Millennium Declaration, which established eight international goals for improving the global human condition. The goals included eradicating extreme hunger and poverty, achieving universal primary education, promoting gender equality and empowering women, reducing child mortality, improving maternal health, combating HIV/AIDS, malaria and other diseases, ensuring environmental sustainability, and developing a global partnership for development. Forty-eight indicators were defined to measure progress towards these goals (UN DESA 2007).

BARRIERS TO MEASURING REAL PROGRESS

Although problems with GDP as a measure of economic progress have been known since its inception and numerous alternative measures have been proposed, there are still significant barriers to developing, implementing, and using better measures of progress. These can be generally categorized as data/methodology issues and social/institutional issues. The data/methodology barriers are common to all indicators, including GDP, and can be dealt with technically. The social/institutional barriers may ultimately be more difficult to overcome.

DATA AND METHODOLOGY BARRIERS TO BETTER MEASURES OF PROGRESS

Indicators are intended to provide information about a system—its current condition, how that condition has changed or will change over time, and the condition of and changes in the forces affecting the system. By choosing particular indicators, one is also defining what is important—one is defining goals. To be useful, an indicator needs to be reliable and the underlying data needs to be available in a timely fashion and at an appropriate scale and scope. In addition, an indicator needs to appropriately inform decisions or measure progress toward desired goals. Critics of alternative or complementary measures argue that data and methodology issues are barriers to the use of these in place of GDP (Parris and Kates 2003; Fox 2008).

Data Barriers

The data-related barriers to better measures of progress involve the reliability and availability of the underlying data. Availability relates to the timeliness and the scale and scope of the data collected. It should be noted this is a partial list of data barriers. For example, data confidentiality can also sorely limit the use of available data.

Data Reliability

Indicator reliability is whether a change in an indicator is an accurate signal of change in the system it is supposed to measure. To the extent that they are based on GDP and SNA data, alternative measures meet the same standard of accuracy. Where alternative measures are based on environmental or social data, the data may be less accurate. However, given a similar level of investment of resources, the environmental and social data could probably match GDP data accuracy. But there will always be variation in data quality both within and between indicators, and instead of drawing an arbitrary line of acceptable data quality to include, we could do a better job of assessing and communicating data quality for all indicators and their components. For example, systems for “grading” data quality have been proposed for this purpose (Costanza, Funtowicz et al. 1992).

Data Timeliness

Timeliness relates to the frequency with which the underlying data is available. GDP is currently reported annually for all countries of the world. In the US and many other developed nations, GDP is reported quarterly. As with data accuracy, where the alternative measures are based on GDP data, the timeliness is the same. Where the alternative measures are based on other sources—such as periodic non-market valuation surveys—the infrastructure does not currently exist to gather and report the data as frequently. However, several of the alternative measures have garnered sufficient support from governments, nonprofits, and foundations to begin creating the infrastructure to gather and report the data on a regular basis. The HDI, GPI, EF, and LPI all fall into this category.

Data Scope and Scale

Data scope is the breadth of the items that are measured. The scope of GDP data has evolved over its 70 year existence and is standardized in its methodology. Data scale is the level of detail of the data collected and reported. Although at the smallest scale, some data is collected at the level of an individual person or business, it is reported at larger scales for privacy reasons. The scale at which GDP data is reported depends on a nation's informational infrastructure. GDP data is reported at the national level for all countries of the world. In the US and other developed nations, GDP is regularly reported at the national, state, and metropolitan regional scales, although the reliability and timeliness of the data decreases with the scale. As with data reliability and timeliness, where the alternative measures use GDP data, their scale and scope are the same as GDP. Since these methodologies were developed, the ISEW and GPI have been calculated for numerous countries including the UK, the US, Netherlands, Australia, Chile, and Canada. It has also been calculated for subnational regions including Alberta, Atlantic Canada, counties in the San Francisco Bay area, and Chittenden County, Vermont. However, for the environmental and social data, there is a lack of institutional infrastructure in all nations of the world. There is clearly a need for better data on multiple aspects of social and environmental conditions including human and ecosystem health, education, and community well-being.

Over its 70 year history, the evolution of the SNA has resulted in the development of the necessary informational infrastructure and intellectual know-how to collect, manage, analyze, and report GDP. This ensures that GDP is an accurate and timely measure of changes in marketed economic activity in developed nations. GDP efforts in nations with less developed governmental and financial accounting institutions continue to improve with assistance from international standardization institutions. Because efforts to collect and manage data for alternative measures have been under way for only 20 to 30 years with extremely limited funding, the informational infrastructure and expertise for this data is much less extensive. The lack of data and infrastructure is a significant barrier to implementing better measures of progress.

Methodology Barriers

The methodology-related barriers involve standardization issues and the values implied by what is actually measured.

Methodology Standardization

Methodology standardization refers to the decisions underlying the construction of an indicator—which items are chosen, how items are measured, and how different items are combined. Originally developed by the US and UK Treasuries, standardization of GDP methodologies is now overseen by the UN's Department for Economic and Social Information and Policy Analysis Statistical Division. Green GDP is also being standardized by this agency. A number of the other alternative measures are also being refined by collaborative efforts of governments, nonprofits, and foundations. These include the GPI, EF, and LPI. As with Green GDP, these efforts have only been under way for a comparatively short period of time and much work remains to be done to reach consensus on the standards.

Values Embedded in Methodologies

Indicators reflect societal choices, values, and goals. We measure what we think is important and our choice of indicators implicitly defines our goals. As society changes, what is most important also changes and indicators should change to reflect that. GDP includes primarily those items that have readily quantifiable monetary value. This is seen by some as being a very 'objective' measurement, but it really reflects the relative social importance of rebuilding material infrastructure after WW II. Some alternative measures are based on measures of ecosystem health and measures of the stocks and flows of natural resources. Many of these measures are considered 'objective' although the accuracy or precision of the underlying data or lack of standardization of the methodology is often called into question. Other alternative measures are based on surveys of individuals' perceptions of well-being. This is generally considered to be very 'subjective' data. A frequent criticism of alternative measures is the subjective nature of the decisions used to create the methodologies (England 1998; Neumayer 1999; Neumayer 2000; Lawn 2003; Lawn 2005). However, as Simon Kuznets

observed while designing GDP, “for those not intimately acquainted with [systems of national accounts] it is difficult to realize the degree to which estimates of national income have been and must be affected by explicit or implicit value judgments” (Kuznets, Epstein et al. 1941, 5).

SOCIAL AND INSTITUTIONAL BARRIERS TO BETTER MEASURES OF PROGRESS

The social and institutional barriers to better measures of progress are primarily based on resistance to change. These barriers include the dominance of the “growth is good” paradigm, lack of leadership, and the power of those with a vested interest in maintaining the status quo.

Dominance of “Growth Is Good” Paradigm

The belief that growing GDP will solve all economic problems is itself the biggest barrier to better measures of progress. Across the world, the growth of economic activity is heralded as a universal remedy. Most reports in the general press equate GDP growth with improvements in human well-being. Business leaders, economists, media, and governments claim that there is no better way to measure economic progress than GDP; there is no better way to eradicate poverty than growing GDP; and there is no way to maintain current levels of employment without growing GDP. As a result, the general public believes that GDP is the correct measure and that growth is good. In addition, many top-level leaders are fixated on the pursuit of throughput-increasing technological advancements and openly reject goals that are inconsistent with growth (Lawn 2001). In short, the main force supporting the continued use of GDP is the GDP-based growth paradigm itself.

The social and institutional barriers to better measures of progress are primarily based on resistance to change. These barriers include the dominance of the “growth is good” paradigm, lack of leadership, and the power of those with a vested interest in maintaining the status quo.

Lack of political leadership

Political leadership on the issue is also lacking, in part because of the lack of public interest and attention, but also because of the perceived danger to political power—if the new indicators show that past and current policies create problems, this will reflect badly on the people in charge of making those policies. One of the most publicized examples of this is China's recent attempt to develop a Green GDP. In 2004, the Chinese government announced that it would develop a methodology for measuring economic growth that factored in the environmental consequences of that growth. Released in 2006, the initial report estimated that 20 percent of China's GDP growth was counterbalanced by depletion of natural resources and degrading the environment (Liu 2006; Jun 2007). China's Green GDP project was canceled in 2007 because of political concerns, in part due to how the results reflected on the performance of specific regions (PBS 2007; Talberth 2008).

Vested interest in maintaining the status quo

There are also organizations and institutions with a vested interest in maintaining the status quo—this includes industries and businesses whose financial success is predicated on continually increasing economic activity as well as those institutions that are charged with collecting, managing, and reporting on the current indicators. Finally, those institutions and organizations that are working on better measures of progress waste time and resources arguing over the minutia of methodology and data rather than presenting a united front on the pressing need for better measures.

MOVING FORWARD: ADOPTING BETTER MEASURES OF GLOBAL PROGRESS

Agree to move forward

The first step is to agree on new global goals: goals that recognize that our economic system is a tool for improving well-being and not something to grow mindlessly for its own sake. The capacity for international consensus on global goals has been demonstrated with processes such as the United Nations Millennium Summit (results include the Millennium Development Goals) and the Intergovernmental Panel on Climate Change (IPCC) (results

include numerous Assessment Reports). An essential element of this step is to agree that GDP does not measure progress towards these new goals and to create an open and transparent process for a global dialogue on working towards the new goals and determining how progress will be measured. The process must engage all relevant stakeholders and define each participant's contribution towards the goals, and how that contribution will be evaluated so that policies, programs, and plans can be adjusted as needed to ensure progress. In addition, we also have to understand, acknowledge, and truly grasp that these national measures are not for bragging rights, for determining the best, happiest, healthiest country or the worst, sorriest, poorest country. Rather they are for defining common goals and measuring each country's contribution towards those goals.

Facilitate the paradigm shift by redefining the problem

Donella Meadows wrote that “the shared idea in the minds of society, the great big unstated assumptions—unstated because unnecessary to state; everyone already knows them—constitutes that society's paradigm, or the deepest set of beliefs about how the world works” (Meadows 1999, 17). Adopting new measures of global progress requires a significant change in the global consciousness as to what actually constitutes progress. The attention of the general public is focused on the issues of climate change, rising oil prices, growing inequality, economic uncertainty, financial collapse, and global social unrest. Once we agree that GDP is not the right measure, we need to talk about how the new and improved measures will help move us in the right direction. This also requires changing the focus of the discussion from “growth” to “progress” and from economic production to sustainable human well-being.

Work to change the paradigm at all scales and in all sectors

Two frequently stated axioms are “what gets measured, gets managed” and “what gets measured, gets done.” However these axioms generally are applied at a small scale, where the person monitoring the measurement has control over actions that affect the measurement. At the scale of national and global well-being, the measurements, actions, and results are not the responsibility of or under the control of any single individual, organization,

or even nation. Consequently there is a disconnect between actions and outcomes. Westward expansion worked in the US as a paradigm until we reached the Pacific Ocean. Expansion continued to be a useful metaphor as long as the world was seen as an “empty world;” however, we are now entering an era where a “full world” metaphor is the more accurate description of reality. We need new ways to talk about progress and new ways to measure progress. We need to change the paradigm and the measures that are used at all levels of society—from international down to individual.

Stop arguing about the details and strive for consensus on the big picture

The switch to better measures of progress is hampered by continuing argument by indicator experts on what is *the* best or correct measure of economic and social progress. The aim is not an academic exercise to find the perfect indicator but an ongoing global dialogue to agree on workable solutions. All indicators are proxies and limited in scope. By themselves none

can really measure all significant aspects of economic, social, and environmental well-being. However, there is a need for consensus on better indicators to set policy, inform decisions, and measure progress. Efforts to develop better measures have been under way for more than a quarter century.

We need new ways to talk about progress and new ways to measure progress. We need to change the paradigm and the measures that are used at all levels of society—from international down to individual.

All of the proposed measures have issues related to data availability, reliability, and accuracy as well as concerns about the objectivity or subjectivity of the underlying methodology. However, arguments about measurement issues only serve to obscure the fact that GDP has the same problems and is no longer a useful tool for evaluating policy decisions. We desperately need to build consensus on new measures.

Use the appropriate indicators for the appropriate task

The purpose of national indicators is to act as a dashboard or a compass—providing a signal or sign as to whether national-level policies and programs are moving us in the right direction. Given the complexity of the problems confronting humanity, a single indicator will most likely not be sufficient; a comprehensive set of integrated indicators may be most effective at providing a signal as to whether national level policies and programs are moving us in the right direction.

CONCLUSIONS

At the time it was conceived, GDP was a useful signpost on the path to a better world: a path 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 back toward the brink of collapse. As Herman Daly said recently:

“Economists have focused too much on the economy’s circulatory system and have neglected to study its digestive tract. Throughput growth means pushing more of the same food through an ever larger digestive tract; development means eating better food and digesting it more thoroughly” (Daly 2008).

The world 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.

The time is right to embark on a new round of consensus-building processes that will re-envision what was institutionalized over the last 65 years. The need is clear for:

- (1) new goals with a broader view of interconnectedness among long-term, sustainable economic, social, and ecological well-being;
- (2) better ways to measure progress towards these goals; and
- (3) an invigorated campaign for the realization of this evolved economic system with new institutions.

We envision a series of coordinated meetings not dissimilar in scope from the IPCC or the Millennium Ecosystem Assessment, and with similarly appropriate leadership. This series of meetings would function somewhat like the original Bretton Woods meetings in that it would set the goals, institutions, and measures for progress at multiple scales, from communities to states, countries and the whole world. There would be major differences from the original Bretton Woods meetings, however. The new meetings would have additional clarity of purpose: to create solutions to today's global challenges, with care to bring onboard all the new thinking about what progress is and how to measure it and with much broader stakeholder participation than the original Bretton Woods. The goal of such a series of meetings would be broad consensus, with broad participation, high-level input, and transparent incorporation of the issues put forth in this paper.

The OECD's *Measuring the Progress of Societies* initiative is already headed in this direction. There were global fora in Palermo in 2004 and Istanbul in 2007 and another is scheduled in South Korea in late 2009. As part of this process, a knowledge base has been created that: (1) describes initiatives around the world on measures of progress and demonstrates the growing interest in these new measures; (2) assists those interested in the development, use, and communication of indicators of progress; and (3) creates a community of experts who can share their experiences and together define best practices (OECD 2009). In November 2007, the European Commission, European Parliament, Club of Rome, OECD, and WWF hosted a conference on *Beyond GDP* with the objectives of clarifying which indexes are most appropriate to measure progress, and how these can best be integrated into the decision-making process. In closing the conference, Stavros

Dimas, the European Commissioner for Environment, noted that “the main achievement of this conference has been to clearly demonstrate the political consensus on the need to go beyond GDP” (Environment Commission 2007). In October 2008, the European Economic and Social Committee voted overwhelmingly to recommend that the EU begin to measure and report on progress that is not exclusively based on economic growth but is also determined by social and environmental factors. The recommendation further calls for these better measures to be taken into account in policy making that will lead “to better and more balanced political choices and contribute to a more sustainable and socially inclusive economy” (EESC 2008). These initiatives need to continue, grow, and multiply, ultimately building a broad global consensus on new goals for society and new measures of progress toward those goals.

The current financial crisis has laid bare some of the inherent flaws in the current system. It has also provided an opening to make significant changes in that system to help create a better, more sustainable, and desirable future. We need to seize that opportunity.

BIBLIOGRAPHY

- Cobb, C., T. Halstead, et al. 1995. If the GDP is Up, Why is America Down? *The Atlantic Monthly*. 276: 59–78.
- Commission on Growth and Development. 2008. *The Growth Report: Strategies for Sustained Growth and Inclusive Development*. Washington, DC: World Bank.
- Costanza, R., R. d'Arge, et al. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387: 253–260.
- Costanza, R., B. Fisher, et al. 2007. Quality of life: An approach integrating opportunities, human needs, and subjective well-being. *Ecological Economics* 61: 267–276.
- Costanza, R., S. O. Funtowicz, et al. 1992. Assessing and communicating data quality in policy relevant research. *Environmental Management* 16: 121–131.
- Daly, H. 2008. *A Steady-State Economy*. UK Sustainable Development Commission.
- Daly, H. E. and J. B. Cobb, Jr. 1989. *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future*. Boston: Beacon Press.
- Diener, E. and E. M. Suh. 1999. National Differences in Subjective Well-Being. *Well-Being: The Foundations of Hedonic Psychology*. Kahneman, Diener and Schwarz. New York: Russell Sage Foundation: 434–450.
- EESC. 2008. *Opinion of the EESC on Beyond GDP—Measurements for Sustainable Development*. Brussels: European Economic and Social Committee.
- England, R. W. 1998. Measurement of social well-being: alternatives to gross domestic product. *Ecological Economics* 25: 89–103.
- Environment Commission. 2007. *Summary notes from the Beyond GDP conference: Highlights from the presentations and the discussion*. Beyond GDP: Measuring Progress, True Wealth, and the Well-being of Nations, Brussels: European Commission.
- Fox, J. 2008. Don't Ditch the GDP. *Time Magazine*. April 10.
- Goossens, Y., A. Mäkipää, et al. 2007. *Alternative Progress Indicators to Gross Domestic Product (GDP) as a Means Towards Sustainable Development*. Brussels: European Parliament, Policy Department A: Economic and Scientific Policy.
- Hails, C. (ed). 2006. *Living Planet Report 2006*. Gland, Switzerland: World Wildlife Fund for Nature.
- Hamilton, K., G. Ruta, et al. 2006. *Where Is the Wealth of Nations? Measuring Capital for the 21st Century*. Washington, DC: The World Bank.
- Henderson, H., J. Lickerman, et al. 2000. *Calvert-Henderson Quality of Life Indicators: A New Tool for Assessing National Trends*. Bethesda, Maryland: Calvert Group.

- IBIBLIO/AIS. 1946. United Nations Monetary and Financial Conference at Bretton Woods. Summary of Agreements. July 22, 1944. *World War II Resources* Retrieved July 27, 2008, from <http://www.ibiblio.org/pha/policy/1944/440722a.html>.
- Inglehart, R. 1997. *Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies*. Princeton, New Jersey: Princeton University Press.
- Jun, M. 2007, August 8, 2007. After green GDP, what next? *Chinadialogue*, from <http://www.chinadialogue.net/homepage/show/single/en/1219-After-green-GDP-what-next->.
- Kuznets, S. 1934. *National Income 1929–1932*. A report to the U.S. Senate, 73rd Congress, 2nd Session. Washington, DC. US Government Printing Office.
- Kuznets, S., L. Epstein, et al. 1941. *National Income and Its Composition, 1919–1938, Volume 1*. New York: National Bureau of Economic Research.
- Lawn, P. A. 2001. *Toward Sustainable Development. An Ecological Economics Approach*. Boca Raton: Lewis Publishers.
- Lawn, P. A. 2003. A theoretical foundation to support the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and other related indexes. *Ecological Economics* 44(1): 105–119.
- Lawn, P. A. 2005. An Assessment of the Valuation Methods Used to Calculate the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Sustainable Net Benefit Index (SNB). *Environment, Development, and Sustainability* 7(2): 185–208.
- Liu, J. 2006 China Releases Green GDP Index, Tests New Development Path. *Worldwatch Institute: Online Features: China Watch*: September 28, 2006.
- Loh, J., J. Randers, et al. 1998. *Living Planet Report 1998: Overconsumption is driving the rapid decline of the world's natural environments*. Gland, Switzerland: World Wildlife Fund for Nature.
- Marcuss, R. D. and R. E. Kane. 2007. US National Income and Product Statistics: Born of the Great Depression and World War II. *Bureau of Economic Analysis: Survey of Current Business* 87(2): 32–46.
- Marks, N., S. Abdallah, et al. 2006. *The (un) Happy Planet Index: An index of human well-being and environmental impact*. London: Friends of the Earth, New Economics Foundation.
- Max-Neef, M. 1995. Economic growth and quality of life: a threshold hypothesis. *Ecological Economics* 15(2): 115–118.
- McCulla, S. H. and S. Smith. 2007. *Measuring the Economy: A Primer on GDP and the National Income and Product Accounts*. Washington, DC: Bureau of Economic Analysis: US Department of Commerce.
- McKibben, B. 2007. *Deep Economy: The Wealth of Communities and the Durable Future*. New York: Time Books.

- Meadows, D. 1999. *Leverage Points: Places to Intervene in a System*. Hartland, Vermont: The Sustainability Institute.
- Neumayer, E. 1999. The ISEW—Not an Index of Sustainable Economic Welfare. *Social Indicators Research* 48(1): 77–101.
- Neumayer, E. 2000. On the methodology of ISEW, GPI and related measures: some constructive suggestions and some doubt on the ‘threshold’ hypothesis. *Ecological Economics* 34(3): 347–361.
- Organization for Economic Cooperation and Development (OECD), Measuring the Progress of Societies project website. 2009. <http://measuringprogress.org/knowledgebase> (Accessed February 12, 2009).
- Parris, T. M. and R. W. Kates. 2003. Characterizing and Measuring Sustainable Development. *Annual Review of Environment and Resources* 28(13): 559–86.
- Public Broadcasting Service (PBS). January 3, 2007. Opinion: Green GDP: Accounting for the Environment in China. *From the Inside: China*, 2007, from <http://www.pbs.org/kqed/chinainside/nature/greengdp.html>.
- Talberth, D. J., C. Cobb, et al. 2007. *The Genuine Progress Indicator 2006: A Tool for Sustainable Development*. Oakland, California: Redefining Progress.
- Talberth, J. 2008. A New Bottom Line for Progress. *2008 State of the World: Innovations for a Sustainable Economy*. Starke. New York: WW Norton & Company.
- United Nations Department of Economic and Social Affairs (UN DESA) website. 2009. http://www.un.org/esa/dsd/dsd_aofw_ind/ind_index.shtml (Accessed February 12, 2009).
- UN DESA. 2007. *The Millennium Development Goals Report*. New York: United Nations Department of Economic and Social Affairs.
- UN Development Program. 1990. *Human Development Report: Overview*. New York: Oxford University Press.
- UN Development Program. 2007. *Human Development Report 2007/2008: Fighting Climate Change: Human Solidarity in a divided world: Summary*.
- Ura, K. and K. Galay (eds). 2004. *Gross National Happiness and Development*. First International Seminar on Operationalization of Gross National Happiness, Thimphu, Bhutan: The Centre for Bhutan Studies.
- Veenhoven, R. 2008. World Database of Happiness: Continuous Register of Scientific Research on Subjective Appreciation of Life, Erasmus University Rotterdam.
- Venetoulis, J. and J. Talberth. 2006. Refining the ecological footprint. *Environment, Development, and Sustainability* 10(4): 441–469.
- Wackernagel, M. and W. E. Rees. 1996. *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island, BC: New Society Publishers.
- World Bank. 1997. *World Development Report: The State in a Changing World*. New York: Oxford University Press.

The Frederick S. Pardee Center for the Study of the Longer-Range Future at Boston University convenes and conducts interdisciplinary, policy-relevant, and future-oriented research that can contribute to long-term improvements in the human condition. Through its programs of research, publications and events, the Pardee Center seeks to identify, anticipate, and enhance the long-term potential for human progress, in all its various dimensions.

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