

IWR

Inclusive Wealth Report 2012

Measuring progress toward sustainability

SUMMARY FOR
DECISION-MAKERS



UNU-IHDP

Secretariat of the
International Human Dimensions Programme
on Global Environmental Change

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FOREWORD

The preliminary findings of the *Inclusive Wealth Report* (IWR) initiative are presented in this publication; they provide for policy-makers an initial analysis toward a broader and comprehensive way of measuring inclusive progress within their economies.

There has for some time been a shared recognition that conventional indicators such as gross domestic product (GDP) or the Human Development Index (HDI) are failing to capture the full wealth of a country. These limitations may be in part fueling environmental decline and degradation because changes in natural or “nature-based” assets are not factored into national accounts, rendering those accounts less useful as an indicator of changes in human well-being.

The report, produced by the UN University International Human Dimensions Programme on Global Environmental Change and UNEP, builds on the findings of the Millennium Ecosystem Assessment of 2005. It echoes, too, the conclusions of the Stiglitz-Sen-Fitoussi Commission of 2009 which argued that measuring well-being requires a shift from conventional production indicators to metrics that incorporate non-economic markets-based aspects of well-being, including sustainability issues.

The preliminary IWR gives an overview on the evolution of some relevant categories of natural capital, such as forests, for a range of countries over a 19-year period, comparing their decline or increase against two other areas: produced capital, such as roads and factories and human capital, including levels of education, knowledge, and creativity. The preliminary findings indicate that it is possible to trace the changes of the components of wealth by country and link these to economic growth, including highlighting the impact of declines or increases in natural capital as an economic productive base.

While many economies do appear to be getting wealthier, it is happening often at the expense of the natural capital base which, in the future and over generations, may move the Inclusive Wealth Index (IWI) from the black into the red.



Achim Steiner

UN Under-Secretary-General and UNEP Executive Director

PREFACE

Although there have been a number of successes in creating a more sustainable global economy, a new report by the United Nations Secretary-General's High-Level Panel on Global Sustainability – *Resilient People, Resilient Planet: A future worth choosing* – recognizes the current global political-economic order's failures, even inability, to implement the drastic changes necessary to bring about true "sustainability."

The Panel's report presents a vision for a "sustainable planet, just society, and growing economy," as well as 56 policy recommendations for realizing that goal. It is arguably the most prominent international call for a radical redesign of the global economy ever issued.

But, for all its rich content, *Resilient People, Resilient Planet* is short on concrete, practical solutions. Its most valuable short-term recommendation – the replacement of current development indicators (gross domestic product or variants thereof) with more comprehensive, inclusive metrics for wealth – seems tacked on almost as an afterthought. Without quick, decisive international action to prioritize sustainability over the status quo, the report risks suffering the fate of its 1987 predecessor, the pioneering Brundtland Report, which introduced the concept of sustainable development, called for a paradigm shift, and was then largely ignored. *Resilient People, Resilient Planet* opens by paraphrasing Charles Dickens: the world today is "experiencing the best of times, and the worst of times." As a whole, humanity has achieved unparalleled prosperity; great strides are being made to reduce global poverty; and technological advances are revolutionizing our lives, stamping out diseases, and transforming communication.

That said, inequality remains stubbornly high, and is increasing in many countries. Short-term political and economic strategies are driving consumerism and debt, which, together with a growing global population – set to reach nearly nine billion by 2040 – is subjecting the natural environment to growing stress. By 2030, notes the Panel, "the world will need at least 50 percent more food, 45 percent more energy, and 30 percent more water – all at a time when environmental limits are threatening supply." Despite significant advances in the past 25 years, humanity has failed to conserve resources, safeguard natural ecosystems, or otherwise ensure its own long-term viability.

Can a report – however powerful – create change? Will the world now rally, unlike in 1987, to the Panel's call to "transform the global economy"? Perhaps, in fact, real action is born of crisis itself. As the Panel points out, it has never been clearer that we need a paradigm shift to achieve truly sustainable global development.

But who will coordinate an international process to study how to en-

courage such a shift, and who will ensure that scientific findings lead to meaningful public-policy processes?

The 2010 Report by the Commission on the Measurement of Economic Performance and Social Progress, commissioned by then French President Nicolas Sarkozy, echoed the current consensus among social scientists that we are mis-measuring our lives by using per-capita GDP as a yardstick for progress.

The United Nations University International Human Dimensions Programme (UNU-IHDP) and the United Nations Environment Programme (UNEP), together with other partners, have worked to find these indicators with their *Inclusive Wealth Report 2012* (IWR 2012), which proposes an approach to sustainability based on measuring natural, manufactured, human, and social forms of capital. The IWR aims to provide a comprehensive analysis of the different components of wealth by country; their links to economic development and human well-being; and policies that are based on social management of these assets.

The IWR 2012 represents a crucial first step in transforming the global economic paradigm, by ensuring that we have the correct information with which to assess our economic development and well-being – and to reassess our needs and goals. While it is not intended as a universal indicator for sustainability, it does offer a framework for dialogue with multiple constituencies from the environmental, social, and economic fields.

The report might suffer from incompleteness in data but it presents a valuable framework for tracking sustainability. It also highlights where more work is needed in plugging the data gaps and adding incrementally more information as it becomes available. But rather than wait for complete accuracy, the report makes a bold attempt to illustrate with the available data whether countries are sustainable and, if not, where they are under-performing and where interventions are needed to rectify the situation. The framework also offers a useful tool for macroeconomic planning agencies as it pays equal attention to all three pillars of sustainable development (social, environmental, and economic). It also talks the language of economic and social institutions and not just the language of the environmental community.

Our situation is critical. As *Resilient People, Resilient Planet* aptly puts it, “tinkering around the margins” will no longer suffice – a warning to those counting on renewable-energy technologies and a green economy to solve our problems. The Panel has revived the call for far-reaching change in the global economic system. Our challenge is to follow words with action this time.



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Origins and rationale for the IWR

The Inclusive Wealth Report 2012 is the first of a series of biennial reports on the sustainability of countries. It looks at the productive base of economies, based on capital assets – produced or manufactured capital, human capital, and natural capital.

The IWR 2012 is a joint initiative of the United Nations University International Human Dimensions Programme on Global Environmental Change (UNU-IHDP) and the United Nations Environment Programme (UNEP), in collaboration with the UN-Water Decade Programme on Capacity Development (UNW-DPC) and the Natural Capital Project.

Context

The congruence of economic, social, and environmental crises over the past decade has forced political, business, and civil society leaders around the world to question our present model of fostering human well-being – in particular our focus on material wealth as the key ingredient for well-being and development. Economic growth is undoubtedly an important determinant; however, it is one of many elements of human well-being. Social and ecological factors are significant – and in some cases the most essential – constituents of well-being. Examples of such factors include education, health, and ecological factors.

The complete *Inclusive Wealth Report 2012* (IWR 2012) begins by unpacking these various determinants and exploring the productive base a coun-

try needs to ensure well-being is maintained and/or improved for future generations. The report evaluates 20 countries, selected for their variety of geographical, social, economic, and ecological characteristics. The results reported should be seen as an exploratory exercise into the empirical estimations of many capital assets and the interplay among them to form the productive base of a nation critical for the maintenance and improvement of well-being.

What we measure and what we manage

Traditional indicators such as per-capita gross domestic product (GDP) and the Human Development Index (HDI) are the primary metrics in assessing the progress of nations today. GDP, an indicator for national economic production (and one for which there is relatively reliable data for nearly all countries), became a convenient yardstick of overall national progress and performance for policy-makers (GDP per capita is in turn used to demonstrate the well-being of a nation's citizens). This created fundamental problems: increases in total economic production do not necessarily translate into improvements in human well-being; increases in the employment and income of individuals are possible outcomes, not automatic consequences, of economic growth.

In an attempt to broaden the perspective of well-being beyond economic growth and income, the Human Development Index (HDI) was developed by adding literacy and mortality rates to the equation of income. Although an improvement, the HDI has a number of well-documented inconsistencies¹ that make it an unsuitable indicator of whether a country's policies are improving the well-being of its citizens.

Neither GDP nor HDI reflect in any way the state of the natural environment, or give any indication of whether levels of well-being are sustainable. The flagship development reports of the international institutions² share a common weakness when it comes to measuring social progress: they focus on current, short-run measures with little or no consideration of the productive base, and in particular the natural capital

¹ See SAGAR, A. & NAJAM, A. (1998).

² See UNITED NATIONS DEVELOPMENT PROGRAMME. (2011); INTERNATIONAL MONETARY FUND. (2011); and the *World Development Report* of the World Bank.

base, of an economy.

There have been recent advances by the World Bank in addressing these weaknesses.³ The IWR draws upon this progress in computing comprehensive wealth, and takes it further by revising the theoretical framework and the methodology for calculating the various capital asset bases.

What we need to manage and what we need to measure

The concept of “sustainable development” has been around for decades. The most recent expression of the concept can be traced back to 1983, when resolution A/RES/38/161, establishing a special UN commission to address the rapid deterioration of the human and ecological environments, called for a global, long-term effort to achieve environmentally and socially sustainable development.

The commission called for a new era of economic growth that was socially and environmentally sustainable. Unfortunately, it fell short on providing guidance on how to quantify progress in a way that could support policy-makers in considering interventions and responses. After a call for a new era of economic growth but no suggestion of how to measure success, countries were left with little choice but to continue using GDP to track progress.

In the run-up to the 2012 Earth Summit (Rio+20), the situation has changed. The report of the High Level Panel on Global Sustainability of the UN secretary general, *Resilient People, Resilient Planet: A future worth choosing* repeated calls for a new, sustainable form of economic growth, but this time also called for new measures to track progress, and specifically called for going beyond our present generation of indicators. The Inclusive Wealth Index (IWI) is designed to provide such a metric. The IWR explains the concept of IWI, its primary strengths, and ways it must further be improved over time.

The inclusive wealth framework

The inclusive wealth framework we propose is based on social welfare theory, and considers the multiple issues that sustainable development attempts to address. It moves away from arbitrary notions of need and redefines the objective of

sustainable development as a discounted flow of utility – in this case, consumption. The framework is flexible enough to allow consumption to include not just material goods, but could eventually include elements such as leisure, environmental security, social relations, and even spiritual aspirations in future reports and calculations.

The determinants we measure for the IWI are the various capital assets a country is able to accumulate, including manufactured, human and natural capital. This asset base, or productive base, provides a tangible measure for governments to use and track over time. Even more important, the framework provides information for policy-makers – particularly planning authorities – on which forms of capital investment should be made for ensuring the sustainability of the productive base of an economy.

The IWR 2012 – Natural Capital

This first IWR focuses on natural capital and, in particular, ecosystem services. The concept of ecosystem services is relatively new and there is a significant gap between using the term and accounting for these services within wealth accounts. It was therefore felt that a first report focusing on natural capital and ecosystem services would serve to highlight their critical importance. In this, the report additionally describes the work required to ensure the inclusion of this critical capital in calculating the productive base of an economy – a task that has been ignored by most planning strategies and tools. The IWR series will progressively increase the coverage of asset values over time, particularly with respect to ecosystem assets (and their associated services) as well as the impacts of climate change and other environmental impacts on these assets. Underpinning this progressive increase in coverage will be a research program on these and wider topics in asset accounting.

Audience and structure of the report

The primary audience of the Inclusive Wealth Report will be governments. More broadly, the report will be of use to development practitioners as well as researchers and the wider development community. The inclusion of environmental damage in the accounts – as well as damages from global environmental change such as climate change – can be useful in determin-

3 See WORLD BANK (2006 AND 2010).

ing cross-country compensations and a guide for international negotiations on the consideration of trans-boundary assets. The report will also be useful for national economic planning agencies when considering macroeconomic fiscal policies. Changes in the various capital assets and their contribution toward the inclusive wealth of a country can provide information on where future investments should be targeted to get the best returns for increasing the productive base of the country.

The report is presented in two parts. Part one introduces the concept of inclusive wealth and provides the first results for a set of 20 countries selected for the 2012 report. Part two presents some of the key lessons for developing ecosystem services accounts and the challenges faced when attempting to value the changes in the capital stocks over time.

The results presented in the report should be seen as illustrative of trends in the changes in the capital assets. This list is not exhaustive, and as the report underlines, data on many of the non-marketed services are scarce or missing, leading to unaccounted value of the capital stocks providing those services. However, the framework has the robustness and capacity to be used to evaluate how well a nation is doing in improving the welfare of its people. What is needed now is the political leadership to take on the challenge the report has highlighted for making this macroeconomic indicator the norm for measuring progress.

The Inclusive Wealth Index

How we calculate inclusive wealth

The Inclusive Wealth Index (IWI) seeks to measure the social value of capital assets of nations beyond manufactured capital. The index is inclusive in the sense that it accounts for other key assets as important components of the productive base of the economy, such as natural capital and human capital. The total value of capital assets – or wealth – is concretely measured by adding up the social worth of each capital type of a nation, where the social (or shadow) prices per unit of capital form act as a weight in its index of inclusive wealth.

Further, the index measures changes in wealth (or per-capita wealth) over a period of time – in this case from 1990 to 2008. Thus, changes in wealth – or *inclusive investment* – are measured by assessing the changes in the physical asset base of a nation over time, and subsequently adjusted for population.

Capital assets

We measure wealth by studying various assets that can be grouped into the following four categories: human capital, manufactured capital, natural capital, and health capital (health is treated separately from human capital for a matter of exposition). There are additionally three adjustments made to these accounts: (1) potential damages that climate change may cause to the wealth of a nation; (2) the study of how increases in oil prices may benefit (or harm) some countries in

building other capital forms; and (3) the role of technical progress as reflected by the change in total factor productivity.

Human capital is primarily captured by measuring the population's educational attainment and the additional compensation over the training period, while the shadow price per unit of human capital as used in the report is obtained by computing the present value of the labor compensation received by workers over an entire working life. We computed shadow prices for every year within the 1990–2008 time period for each country, and used the average of this rental price of one unit of human capital over time as the representative weight for entering human capital into the wealth accounting framework.

Calculations of manufactured capital are based on the Perpetual Inventory Method (PIM) after setting an initial capital estimate. Once the initial capital level is estimated, changes over time are derived from net capital formation as reported in the system of national accounts. Steady-state estimates are used for the initial calculation, thus assuming that the capital-output ratio of the economy is constant in the long-term.

Natural capital assets in the report are comprised of the following five categories: (1) forests, represented by timber and non-timber forest benefits (NTFB); (2) fisheries (only for four countries); (3) fossil fuels (oil, natural gas, and coal); (4) minerals (bauxite, copper, gold, iron, lead, nickel, phosphate, silver, tin, and zinc); and (5) agricultural land. Total asset value is estimated by multiplying the physical amount available of the asset by its corresponding rental price.

Changes in health capital are captured by extensions or reductions in life expectancy. Such changes are basically analyzed by calculating the years of life remaining of a given population in different time periods, with the population age distribution and the people's probability of death being the key inputs into the model. As far as the shadow price of health capital is concerned, it is measured by value of a statistical life year.

The Adjusted Inclusive Wealth Index (IWI_{adj}) is a corrected representation of countries' capital assets, factoring in specific aspects that further affect the size of the productive base of a nation – namely carbon damages, oil capital gains, and total factor productivity. Carbon damages are estimated by multiplying total emissions by social costs, as derived by previous studies. Oil capital gains are estimated at around 5 percent annually from 1990–2008. Total factor productivity mea-

asures the change in aggregate output that cannot be explained by the growth rate of observable inputs. This residual in growth accounting can be understood as a proxy variable of technological progress, which is hard to measure directly.

How have countries performed over the last two decades from an inclusive wealth perspective?

Positive growth rates in inclusive wealth correspond to sustainability – countries with a positive iwi demonstrate that their productive base is not being eroded and they have maintained the asset base to produce similar levels of output for consumption by future generations. Table 1 shows that all countries have positive iwi growth rates except for Russia. China, Kenya, India, and Chile exhibit the highest growth among all countries studied. However, because changes in population size can greatly affect how capital is distributed, we also look at per-capita iwi to determine whether countries are on truly sustainable paths.

Column 2 in Table 1 shows the demographic development of the countries under study. Kenya, Saudi Arabia, and Nigeria top the list with average annual population growth rates of at least 2.4 percent. We see a major shift of iwi growth rates as shown in Table 1 and Figure 1 when population is factored into the equation.

For instance, Kenya experienced relatively high absolute iwi growth of 2.85, while only managing a per-capita iwi growth rate of 0.06. The picture is worse in the case of Saudi Arabia, Nigeria, Columbia, South Africa, and Venezuela, all of whom experienced negative per-capita iwi growth. These countries have two options to reverse this trend: they must either reduce population growth rates or re-invest in the different capital asset bases to increase the rate of iwi growth.

The situation is reversed in Russia: although the country's iwi growth rate per capita is still negative, the situation has been slightly alleviated due to steady population decline since 1993.

How do different capital forms contribute to per-capita wealth creation?

Figure 3 illustrates the average contribution of different capital types to average per-capita iwi for each of the 20 countries. Notably, the three middle-income countries among the top five – China, India, and Chile – experienced high

| | | Inclusive Wealth Index | Population growth | IWI per capita | Key |
|---|--------------|---------------------------|----------------------|-------------------|-------------|
|  | Australia | 1.41 | 1.29 | 0.12 | 3.0 – 2.0 |
|  | Brazil | 2.30 | 1.38 | 0.91 | 2.0 – 1.0 |
|  | Canada | 1.41 | 1.03 | 0.37 | 1.0 – 0.5 |
|  | Chile | 2.56 | 1.35 | 1.19 | 0.5 – 0.0 |
|  | China | 2.92 | 0.83 | 2.07 | 0.0 – -1.0 |
|  | Colombia | 1.62 | 1.70 | -0.08 | -1.0 – -2.0 |
|  | Ecuador | 2.14 | 1.76 | 0.37 | |
|  | France | 1.95 | 0.51 | 1.44 | |
|  | Germany | 2.06 | 0.23 | 1.83 | |
|  | India | 2.66 | 1.74 | 0.91 | |
|  | Japan | 1.10 | 0.19 | 0.91 | |
|  | Kenya | 2.85 | 2.79 | 0.06 | |
|  | Nigeria | 0.53 | 2.44 | -1.87 | |
|  | Norway | 1.33 | 0.67 | 0.66 | |
|  | Russia | -0.50 | -0.19 | -0.31 | |
|  | Saudi Arabia | 1.57 | 2.72 | -1.12 | |
|  | South Africa | 1.57 | 1.64 | -0.07 | |
|  | U.K. | 1.26 | 0.38 | 0.88 | |
|  | U.S. | 1.74 | 1.04 | 0.69 | |
|  | Venezuela | 1.70 | 1.99 | -0.29 | |

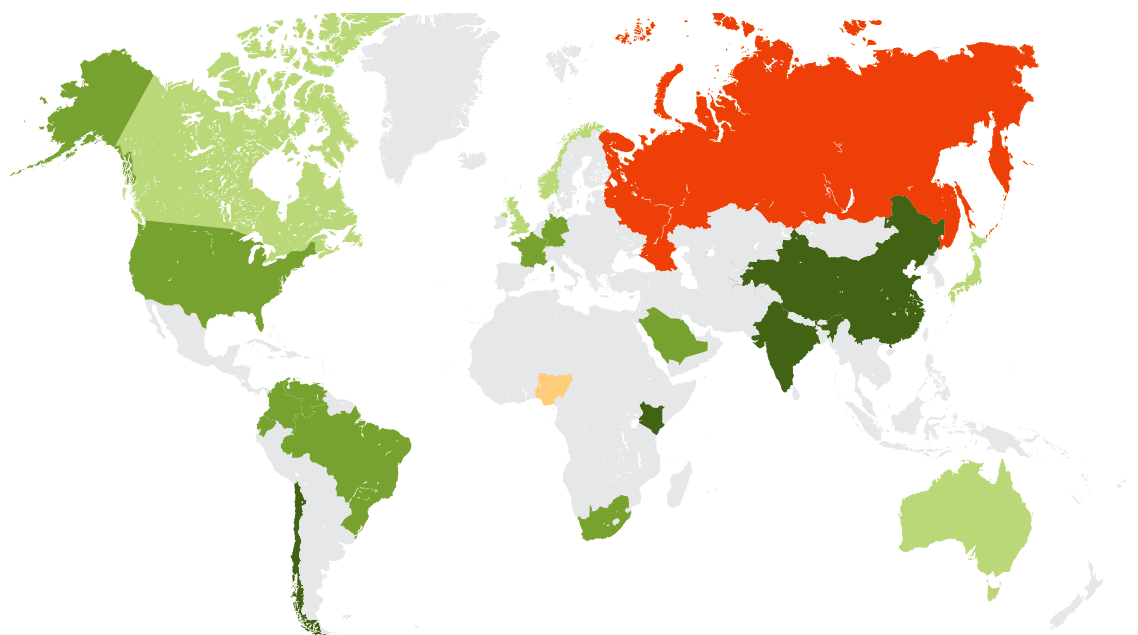
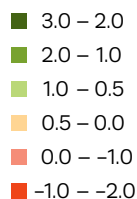
growth rates for manufactured capital, while France and Germany, the other two of the top five countries, experienced primarily human capital growth. Note also the low change in natural capital for Germany and France in comparison to the rest.

Turning to the bottom five countries in iwi growth per capita, we see that a decline in natural capital generally explains the negative wealth trend. The exception is Russia, where the negative iwi growth is caused by the steady decline of manufactured capital. For the bottom two countries (Saudi Arabia and Nigeria), natural capital and in particular fossil fuels represent the main component of wealth. Since the natural capital accounts in these countries are based to a large extent upon exhaustible resources, these results are unsurprising. As the basis of renewable natural resources is too small to offset this decline, the advisable route would be to invest and achieve

TABLE 1
Measuring countries' progress. Average annual growth rates, period 1990–2008.
(VISUALIZED IN FIGURE 1)

Inclusive Wealth Index

Key



Inclusive Wealth Index per capita

Key

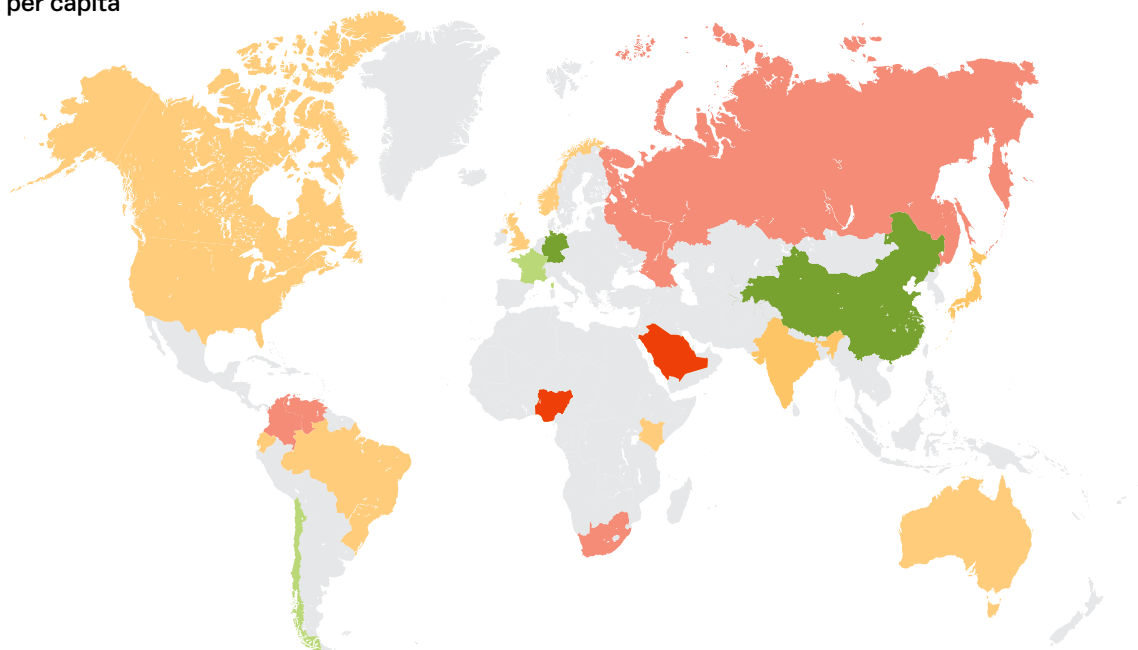
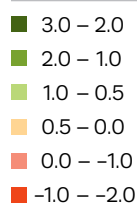


FIGURE 1
Measuring countries' progress. Average annual growth rates, period 1990–2008.

(DATA IN TABLE 1)

higher returns in other types of assets, such as manufactured and/or human capital. For example, lessons can be learned from Norway which shows positive IWI growth and a relatively modest decline in natural capital despite being a major producer of oil and natural gas.

In general, the various capital categories have contributed differently to IWI growth per capita in different countries. As expected, most of the countries in our sample have increased manufactured capital stocks, in particular the more recently industrialized countries. But countries showing high growth rates in manufactured capital saw much lower increases of human capital

and falls in natural capital. IWI growth in Brazil, Germany, and Saudi Arabia was driven primarily by rapid growth in human capital – 48 percent, 46 percent, and 43 percent, respectively. The increase in human capital was found to be the prime factor offsetting the decline in natural capital that occurred in almost all nations. In most cases, human capital is accumulated by between 20 percent and 36 percent over the years under study.

The nations with the lowest human capital growth were generally highly industrialized countries such as Australia and the United States (8 percent), Japan (12 percent), the United Kingdom (14 percent), and Norway (15 percent). All of these

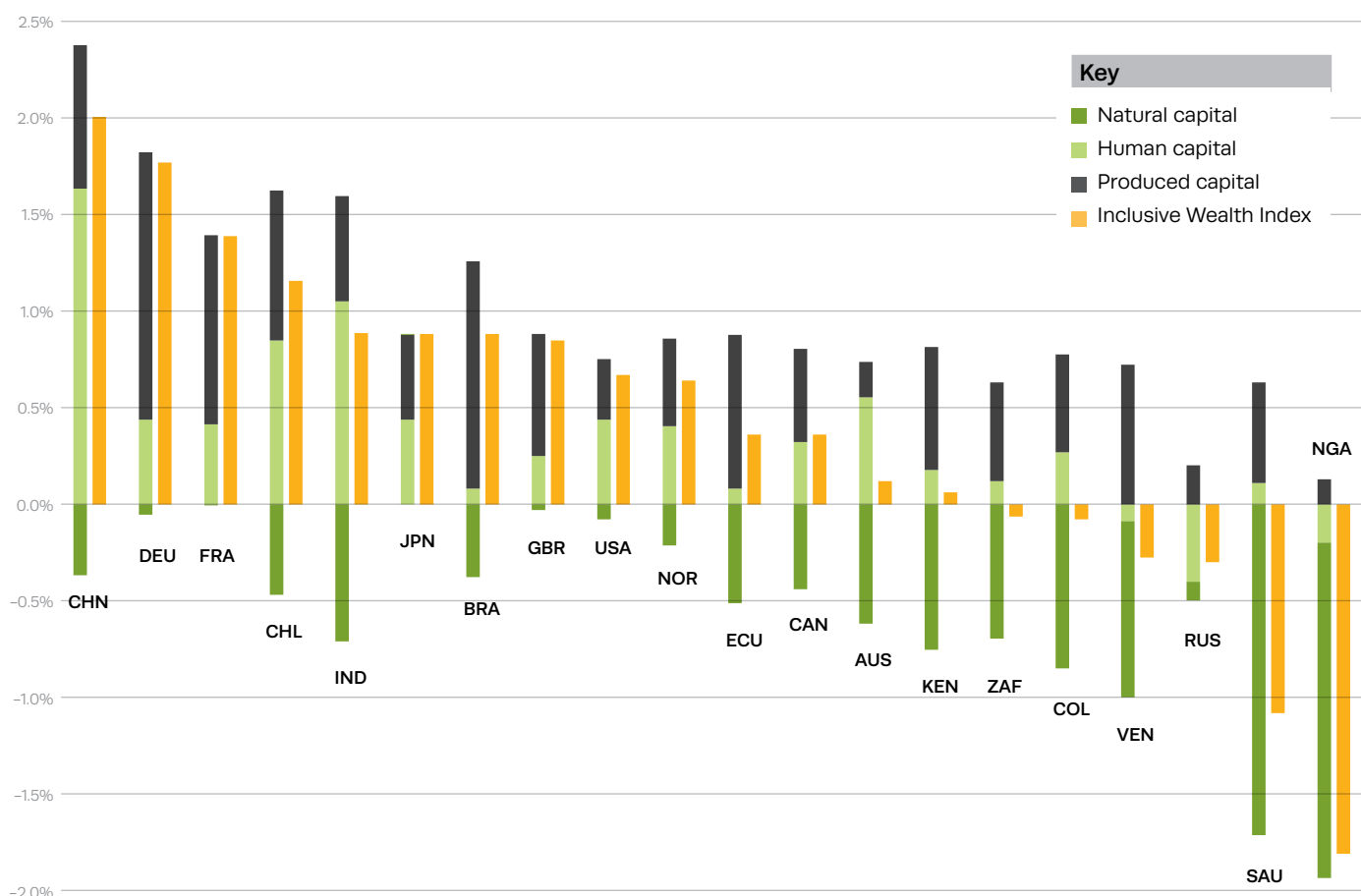


FIGURE 2
Average annual growth rates (per capita) disaggregated by capital form

economies had already accumulated a high stock of human capital before 1990. This result was driven primarily by the variable we used in the report, years of total schooling of the population. A key lesson for developing countries is that human capital can only go so far in making up for losses elsewhere, and a strategy to re-invest in natural capital is necessary for true sustainability.

Most countries (with the exception of Japan) experienced declines in their natural capital asset base. The largest declines occurred in the United Kingdom and Kenya. In the case of the U.K., declines in the fossil fuels asset base were at the heart of the loss, while Kenya experienced drastic declines in forest cover.

Figure 3 shows the capital composition of the 20 countries as an average between 1990 and 2008. Manufactured capital represents around 17 percent of the wealth portfolio for a majority of countries. Manufactured capital is overshadowed in every country by human capital, and in most countries by natural capital as well. Only in the highly industrialized countries – France, Germany, Japan, Norway, the United Kingdom, and the United States – do fixed capital assets contribute more to the productive base than natural resources.

Notable are countries with relatively low shares of produced capital – although for different reasons. The United Kingdom and the United States have a particularly disproportional share structure, with human capital dominating with 90 percent and 78 percent shares, respectively. Natural capital, on the other hand, tends to be more relevant in developing countries, such as Venezuela and Colombia, and is the prevailing factor in those economies whose GDP is largely driven by oil extraction, such as Nigeria, Russia, and Saudi Arabia. France, Japan, and United Kingdom were the countries with the lowest share of natural capital as a component of the total capital asset base: natural resources constitute only 1 percent of total capital value in all three countries.

So far, we have looked at the composition and evolution of total wealth, taking into account demographic development. However, societal progress (or regress) can also be assessed from other angles, most typically, by the relative change in gross domestic product (GDP) and Human Development Index (HDI) over time. The former measures the value of all goods and services manufactured in an economy within one year, while the latter entails a broader concept of societal

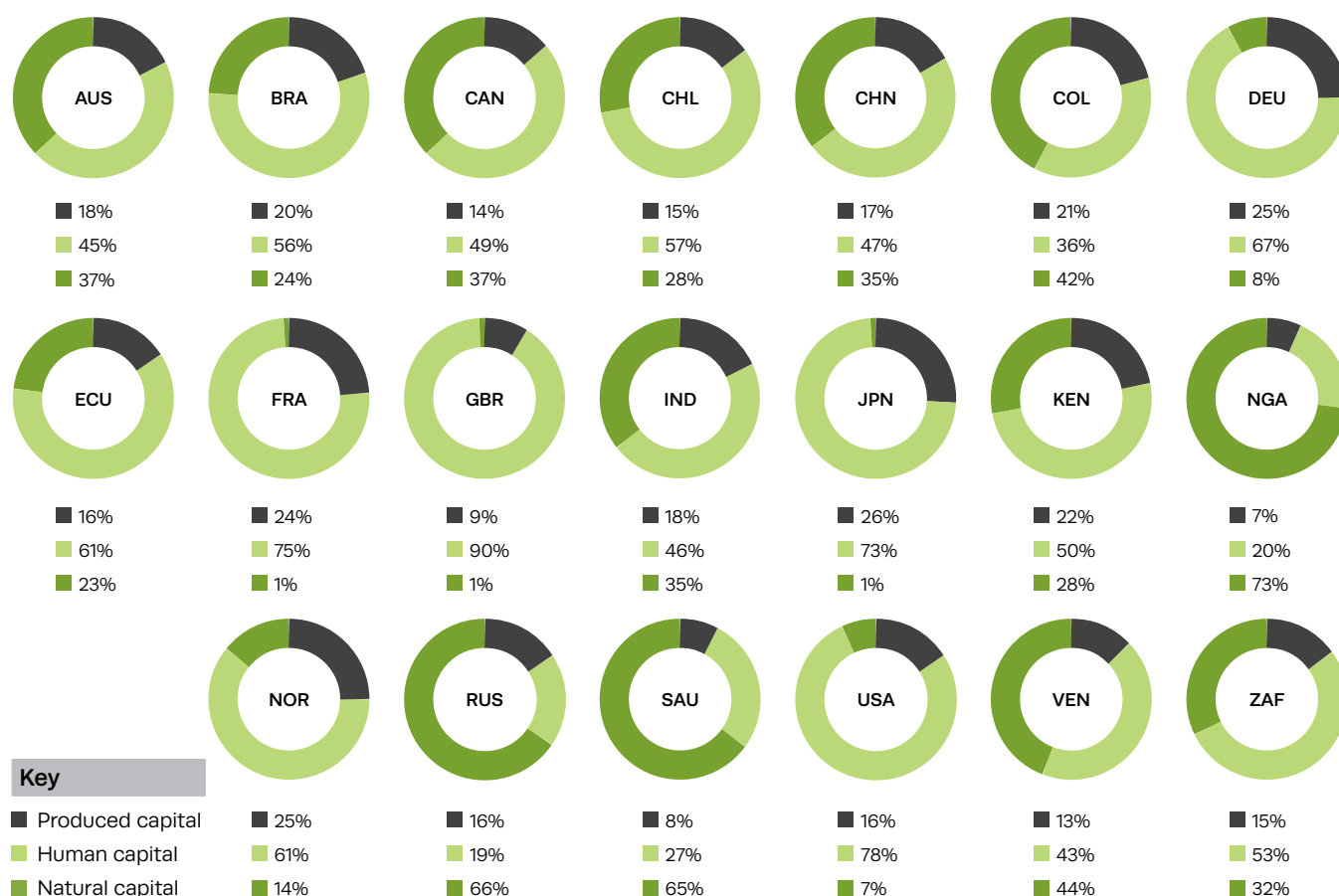


FIGURE 3
Composition of the productive base of the economy. Average from 1990–2008.

development, extending gross national income per capita by other determinants of social well-being, such as life expectancy and expected years of schooling. These indicators generally lead to different empirical findings concerning the progress of a nation. Figure 4 compares IW1 per capita, GDP per capita, and HDI for our sample of 20 nations for the period between 1990 and 2008. The IW1 column in this figure shows average annual per-capita change in IW1 over the reference period. In column 2 and 3 we see the rates of change in HDI and per-capita GDP, respectively.

All countries experienced positive GDP per capita growth rates over the 19-year period assessed. South Africa is the only country studied which, over the 19-year reference period, experienced a decline in HDI. At the same time, it saw an average growth rate of 1.3 percent of GDP and a negative growth rate in IW1. Six countries had negative IW1 growth rates. South Africa's dismal performance in all three indicators suggests that urgent interventions are necessary, including major investments in all three categories of capital.

There are six countries that saw positive growth rates in both HDI and GDP per capita but had negative growth rates for IW1 per capita – Co-

lombia, Nigeria, Russia, Saudi Arabia, and Venezuela. All six countries have large reserves of fossil fuels and/or forest stocks. The oil-producing countries among the six – Russia, Saudi Arabia and Venezuela – have been rapidly depleting oil reserves but not investing in produced and human capital bases, thus the negative growth in IW1 per capita. Although all six countries posted positive per-capita GDP rates, the negative IW1 growth rates suggest an unsustainable track, a suggestion strengthened by the fact that most of the GDP growth has come at the expense of the depletion of their natural capital base.

Although China demonstrated the highest IW1 growth rate, the IW1 breakdown demonstrates a need for China to re-evaluate its development strategy and increase investment in natural capital while looking for higher returns on produced and human capital. India, meanwhile, saw only 0.9 percent growth in IW1 over the 19 years under study compared to China's 2.1 percent. India will need to significantly improve its human capital base as its natural capital decreases to maintain a positive IW1. But the other question is whether India can continue seeing precipitous declines of natural capital, and how natural capital decline

will affect its long-term growth and sustainability.

Based on HDI, Colombia and Nigeria are in the top five performers, although both are among the bottom countries from an IWI perspective. This is largely explained by the absence of natural capital in HDI calculations.

If we look at GDP, the traditional tool for judging the performance of economies, it becomes evident that all economies have seen at least some progress. For most countries (with the exceptions of France and Germany), GDP growth rates are higher than IWI. The reasons for this are complex, but generally indicate that capital stocks are not keeping pace with growth in GDP. As this continues, less and less capital will be available to feed the production system, and unless technological advancements make up the difference (unrealistic in most cases), consumption will outpace production and declines will ensue.

What is the role of natural capital in inclusive wealth?

Natural capital represents an essential pool of resources that can induce the building of other capital assets, such as education, health or manufactured capital. Trends in wealth accounting indicate that natural capital constitutes, on average, about 30 percent of national wealth estimates for the country sample analyzed here, but it ranges from 1 percent for some countries such as France, Japan, and the United Kingdom to over two-thirds of national wealth for Saudi Arabia, Russia, and Nigeria.

Figure 5 shows comparisons of average annual growth rates in wealth and natural capital at a per-capita level. To facilitate the understanding of these per-capita growth rates, we classify the countries in four groups based on growth (or decline) in wealth and natural capital:

- Increase in wealth and natural capital (quadrant I in Figure 5).
- Decline in wealth and increase in natural capital (quadrant II in Figure 5).
- Decline in wealth and natural capital; (quadrant III in Figure 5).

1 INCLUSIVE WEALTH INDEX per capita

| | | |
|------|--|--------------|
| 2.1 | | China |
| 1.8 | | Germany |
| 1.4 | | France |
| 1.2 | | Chile |
| 0.9 | | Brazil |
| 0.9 | | India |
| 0.9 | | Japan |
| 0.9 | | U.K. |
| 0.7 | | Norway |
| 0.7 | | U.S. |
| 0.4 | | Canada |
| 0.4 | | Ecuador |
| 0.1 | | Australia |
| 0.1 | | Kenya |
| -0.1 | | Colombia |
| -0.1 | | South Africa |
| -0.3 | | Russia |
| -0.3 | | Venezuela |
| -1.1 | | Saudi Arabia |
| -1.8 | | Nigeria |

2 HUMAN DEVELOPMENT INDEX

| | | |
|------|--|--------------|
| 1.7 | | China |
| 1.4 | | India |
| 1.3 | | Nigeria |
| 0.9 | | Colombia |
| 0.9 | | Brazil |
| 0.8 | | Russia |
| 0.8 | | Venezuela |
| 0.7 | | Chile |
| 0.7 | | France |
| 0.7 | | Germany |
| 0.6 | | Ecuador |
| 0.6 | | Norway |
| 0.6 | | U.K. |
| 0.5 | | Saudi Arabia |
| 0.4 | | Japan |
| 0.4 | | Kenya |
| 0.3 | | Australia |
| 0.3 | | Canada |
| 0.2 | | U.S. |
| -0.1 | | South Africa |

3 GROSS DOMESTIC PRODUCT per capita

| | | |
|-----|--|--------------|
| 9.6 | | China |
| 4.5 | | India |
| 4.1 | | Chile |
| 2.5 | | Nigeria |
| 2.3 | | Norway |
| 2.2 | | Australia |
| 2.2 | | U.K. |
| 1.8 | | Ecuador |
| 1.8 | | U.S. |
| 1.7 | | Colombia |
| 1.6 | | Brazil |
| 1.6 | | Canada |
| 1.5 | | Germany |
| 1.3 | | France |
| 1.3 | | South Africa |
| 1.3 | | Venezuela |
| 1.2 | | Russia |
| 1.0 | | Japan |
| 0.4 | | Saudi Arabia |
| 0.1 | | Kenya |

- Increase in wealth and decline in natural capital; (quadrant IV in Figure 5).

In general, the empirical findings show that the majority of countries (13 of 20) experienced a decline in natural capital stocks over the reference period, while achieving a growth in wealth (see quadrant IV in Figure 5). Another six countries (Colombia, Nigeria, Russia, Saudi Arabia, South Africa, and Venezuela) experienced both a decline in wealth, and in natural capital. No country in the sample exhibits a decline in wealth while increasing its natural capital (quadrant II in Figure 5), providing evidence that increases in natural capital do not come at the expense of a decline in overall inclusive wealth.

The United Kingdom experienced the largest drop in natural capital, followed by Kenya. China experienced a relatively smaller drop in natural capital compared to India and Chile, countries whom, together with China, experienced some very high GDP growth rates over the time period. China also

FIGURE 4

Comparing average growth rates per annum in IWI per capita, GDP per capita, and HDI.

showed a strong IW1, which appears to suggest sustainable growth. However, the growth rates of human capital and produced capital have shown signs of slowing down, highlighting again diminishing returns of human and produced capital.

Which components explain changes in natural capital?

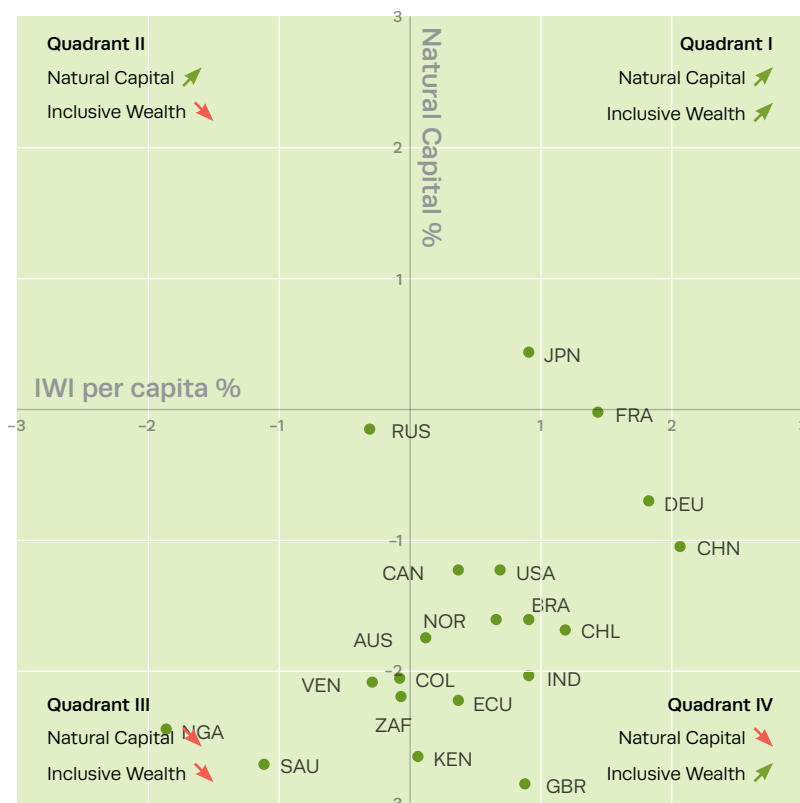
We can further explore the growth rates in natural capital by investigating what determinants are influencing them. We start by looking at the proportion in wealth change that is attributed to the five aggregated categories of natural capital accounts: agricultural and pastureland, forest resources, fisheries, fossil fuels (oil, natural gas, and coal), and minerals. In doing so, we also take into account changes in population over time. This is important, as a decrease in per-capita natural wealth can be triggered by depletion of the natural resources, by population growth that outpaces the change in natural capital, or both. Per-capita measures are commonly used for comparing economies of different scale; in our analysis, however, the per-capita index of natural capital is used to primarily show the pace at which the natural resource endowment of each member of the society is changing.

We have shown that demographic develop-

ment is the main driver behind the changes in natural capital. On average for this country sample, population change explains 62 percent of the change in natural capital, and over fifty percent of the changes in natural capital per capita in 13 of the 20 countries. The demographic pressure on natural capital is particularly evident for developing countries such as Kenya, Nigeria, and India, accounting for more than 90 percent of per-capita wealth change. On the other end of the spectrum are the United Kingdom and Japan, two high-income countries whose population changes have contributed to negative growth rate in per-capita wealth, but only in the range of 12 percent. Only one nation experienced positive changes to per-capita natural capital (33 percent) due to demographic development – Russia. But despite declining population growth over the past two decades, Russia's relative decrease in population has not been enough to outweigh the overall decline in natural capital. Overall, the data empirically support the view that increasing population will place higher burden on a decreasing natural capital asset base.

Turning to the contribution of the natural capital components, fossil fuels constitute the second main driver (21 percent) of change in natural wealth. The proportion varies considerably depending on the natural resource composition of the countries. Fossil fuels explain a large part of the negative growth rates in the United Kingdom (82 percent), which have been triggered by the depletion of natural gas. Germany, Russia, and Norway showed similar trends along with declines in coal (Germany) and natural gas (Russia and Norway). Interestingly, loss in forests – a renewable resource – explained on average around 11 percent of the changes in natural capital on a per-capita basis.

FIGURE 5
Natural capital and Inclusive Wealth Index per capita for 20 countries.



REFERENCES

- SAGAR, A. & NAJAM, A. 1998. The human development index: A critical review. *Ecological Economics*, 25(3), 249-264.
- UNITED NATIONS DEVELOPMENT PROGRAMME. (2011). *Human development reports. HDI trends 1980-2010*. Retrieved May 2011, from <http://hdr.undp.org/en/statistics/hdi/>
- INTERNATIONAL MONETARY FUND. (2011). *International financial statistics*. Exchange Rate Archives. Retrieved May 2011, from <http://www.imfstatistics.org/imf/>
- WORLD BANK. (2006). *Where is the wealth of nations?* Washington, DC: World Bank.
- WORLD BANK. (2011). *The changing wealth of nations: Measuring sustainable development in the new millennium*. Washington, DC: World Bank.

ABBREVIATIONS

| | |
|----------|---|
| IWI | Inclusive Wealth Index |
| PIM | Perpetual Inventory Method |
| NTFB | non-timber forest benefits |
| IWIADJ | Adjusted Inclusive Wealth Index |
| GDP | gross domestic product |
| HDI | Human Development Index |
| IHDP | International Human Dimensions Programme on Global Environmental Change |
| UNU-IHDP | United Nations University - International Human Dimensions Programme on Global Environmental Change |
| UNW-DPC | UN-Water Decade Programme on Capacity Development |
| UNEP | United Nations Environment Programme |
| UN | United Nations |

Key lessons

A number of key lessons emerge from the report:

Substitution

The inclusive wealth framework allows substitution across the different forms of capital and refrains from asserting any specific interest of any particular constituency. The degree of substitutability is determined by the ratio of the shadow prices of the capitals in question. The shadow prices hold the key to the degree of substitution and/or transformation in the country.

The interconnectivity of capitals

One of the important features of the inclusive wealth framework is the importance of not just one form of capital but of a basket of capitals for ensuring sustainability and improvement of human well-being. For example, the value of human capital is measured by the years of total schooling and wages. However, extending the human capital equation to include health as a function of the other capitals, and in particular, as a direct function of natural capital, may change the results. This can be captured to a certain extent by the shadow prices of the respective capital assets. We do understand that the report at the very beginning states that the shadow prices of an asset are a function of the stocks of all assets. If this is the case, we would have expected higher shadow prices in natural capital, which might not be reflected in the proxy prices, used in computing the values in the report.

Population change

The other important inclusion in the inclusive wealth framework is the treatment of population. The framework acknowledges growing population as an important variable in determining a country's sustainable track, and in many cases highlights the need for policies to increase the marginal rate of transformation of natural capital to human and produced capital to ensure sustainability.

Interconnected externalities

The growing frequency of global environmental issues such as climate change, nitrogen deposition, and biodiversity loss has impacts on a country's wealth and sustainability. Even if a country does all the right things on its own, its inclusive wealth may be increased or reduced by variables beyond its control. The report looks at climate change as a key (usually negative) externality, information about which might become useful in designing international compensation/transfer regimes. The report highlights the need for additional systematic research into global externalities.

Shadow prices

A key strength of the inclusive wealth framework lies in the shadow price, which captures the degree to which the various forms of capital can be substituted by other capitals. It also reflects each capital's contribution to inter-generational well-being at each time period, as well as expected future scarcities. Shadow prices additionally capture the externalities produced in the use of the capital.

The shadow price is the strength of the framework, but also poses unique challenges: the market prices we observe for many of the capitals are adequate for the exercise. However, as the report notes, for natural capital, and to a lesser extent, human and social capital, market prices often become problematic. The non-observable nature of many of the prices points toward the use of different approaches to find the shadow prices for these capitals.

The IWR 2014

Although social capital is discussed in the theoretical model, the empirical computations of inclusive wealth in the 2012 report do not reflect

this key and important capital base. The next iteration of the *Inclusive Wealth Report* in 2014 will attempt to record some preliminary estimates on the value of the social capital asset base for a limited selection of countries. At the same time, the number of countries covered will be expanded and the computation of the other capital assets, including the natural capital base will be improved.

KEY FINDINGS

- 1 70 percent of countries assessed in the 2012 *Inclusive Wealth Report* present a positive Inclusive Wealth Index (IWI) per-capita growth, indicating sustainability.
- 2 High population growth with respect to IWI growth rates caused 25 percent of countries assessed to become unsustainable.
- 3 While 19 out of the 20 countries experienced a decline in natural capital, 6 of them also saw a decline in their inclusive wealth, thus following an unsustainable track.
- 4 Human capital has increased in every country, being the prime capital form that offsets the decline in natural capital in most economies.
- 5 There are clear signs of trade-off effects among different forms of capital (manufactured, human, and natural capital) as witnessed by increases and declines of capital stocks for 20 countries over 19 years.
- 6 Technological innovation and/or oil capital gains outweigh decline in natural capital and damages from climate change, moving a number of countries from an unsustainable to a sustainable trajectory.
- 7 25 percent of countries assessed which showed a positive trend when measured by GDP per capita and HDI were found to have a negative IWI.
- 8 The primary driver of the difference in performance was the decline in natural capital.
- 9 Estimates of inclusive wealth can be improved significantly with better data on the stocks of natural, human, and social capital and their values for human well-being.

KEY RECOMMENDATIONS

- 1 Countries witnessing diminishing returns in their natural capital should build up their investments in renewable natural capital to increase their inclusive wealth and the well-being of their citizens.
- 2 Countries should mainstream the Inclusive Wealth Index within their planning and development ministries so that projects and activities are evaluated based on a balanced portfolio approach that includes natural, human, and manufactured capital.
- 3 Countries should support and speed up the process of moving from an income-based accounting framework to a wealth accounting framework.
- 4 Governments should evaluate their macroeconomic policies, such as fiscal and monetary, based on their contribution to the IWI of the country, and move away from GDP per capita.
- 5 Governments and international organizations should establish research programs for valuing key components of natural capital and, in particular, ecosystem services.

“Until the yardsticks which society uses to evaluate progress are changed to capture elements of long-term sustainability, the planet and its people will continue to suffer under the weight of short-term growth policies.”

Sir Partha Dasgupta

Science Advisor to the *Inclusive Wealth Report 2012* and Frank Ramsey Professor Emeritus of Economics at the University of Cambridge.

The authors of this report argue that the indicators used in the past to measure human societies' success have proven to be insufficient. Economic production indicators such as gross domestic product (GDP) and the Human Development Index (HDI) fail to reflect the state of natural resources or ecological conditions, and both focus exclusively on the short term, with no indication of whether national strategies are sustainable over longer periods of time.

The *Inclusive Wealth Report 2012* (IWR) presents an index that measures the wealth of nations by carrying out a comprehensive analysis of a country's productive base. The Inclusive Wealth Index (IWI) incorporates various capital assets: manufactured capital, human capital, and natural capital. This first IWR focuses on natural capital.

The IWR demonstrates changes in inclusive wealth from 1990 to 2008, and includes a comparative long-term analysis to GDP for an initial group of 20 countries.

It also provides guidance and key lessons for developing ecosystem services accounts, and reflects on the challenges of evaluating changes in capital stocks over time.

The IWR will be published every two years and will offer policy-makers and planning authorities a framework for asset portfolio management – to assess how and where investments should be made to ensure the sustainability of the productive base. More broadly, it will be of use to scholars and development practitioners for the study and refinement of sustainable growth strategies.

The entire *Inclusive Wealth Report 2012* is available for free download on the IHDP website:

www.ihdp.unu.edu



The *Inclusive Wealth Report 2012* is a joint initiative of the United Nations University International Human Dimensions Programme on Global Environmental Change (UNU-IHDP) and the United Nations Environment Programme (UNEP) in collaboration with the UN Water Decade Programme on Capacity Development (UNW-DPC) and the Natural Capital Project.

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