

ENSURING ENVIRONMENTAL SUSTAINABILITY

Measuring Progress Toward
the 7th Millennium Development Goal



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Foreword

The seventh Millennium Development Goal (MDG)—ensure environmental sustainability—calls on countries to “reverse the losses of environmental resources” by 2015. Making this goal operational has proven to be a challenge for most countries, not least because of a lack of indicators of sustainable development.

Every day, decision makers at all levels are faced with choices regarding the use of natural resources and the environmental impacts of development projects and policies. Without sound indicators to guide these choices, it is difficult for countries to determine if they are in fact on a sustainable path. Our goal below is to suggest practical solutions for measuring sustainability.

The World Bank is publishing a companion volume titled *Where is the Wealth of Nations?*, which provides estimates of total wealth including produced, natural, and human and institutional capital. Natural capital is a significant share of total wealth in low income countries, greater than the share of produced capital. Yet, on a per-capita basis, many poor countries have experienced declines in both total and natural capital. This is bad news not only from an environmental point of view, but also from a broader development perspective.

Measuring the change in total wealth and the change in natural wealth will contribute to providing a comprehensive measure of whether a development path is sustainable. This should go hand in hand with a concerted effort to inventory and value the environmental services that underpin economic activity and human wellbeing.

Five years after the Millennium Declaration, the development community and developing countries are one-third of the way to the MDG target date of 2015. There is a shared sense of urgency about meeting the MDGs. However, it would be tragic if the achievements of 2015 are not sustainable because soils have been mined and fisheries and forests depleted. Avoiding this outcome is the true seventh Millennium Development Goal.

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Ensuring Environmental Sustainability

Measuring Progress Toward the 7th Millennium Development Goal

From forests, fisheries, and coral reefs, to agricultural land and mineral deposits, human societies depend for their survival upon healthy ecosystems and the sustainable use of these natural resources. This principle underpins the eight Millennium Development Goals (MDGs) that the international community is committed to achieving by 2015 (Box 1). Without a sustainable environmental policy, efforts to reduce poverty, hunger, and child mortality cannot be enduring.

Achieving environmental sustainability presents major challenges. The Millennium Ecosystem Assessment, 2005, and the Task Force on Environmental Sustainability (UN Millennium Project, 2005) showed recently that the problems of environmental degradation and biodiversity loss require urgent action.

However, there is an underlying issue. Until now, there have been no adequate means of measuring environmental sustainability. MDG-7 is committed to reducing by half the numbers of people without access to safe drinking water; improving the lives of at least 100,000 slum dwellers; and reversing the loss of environmental resources. While the first two

Box 1. The Millennium Development Goals

- | | |
|--------|----------------------------------------------|
| Goal 1 | Eradicate extreme poverty and hunger |
| Goal 2 | Achieve universal primary education |
| Goal 3 | Promote gender equality and empower women |
| Goal 4 | Reduce child mortality |
| Goal 5 | Improve maternal health |
| Goal 6 | Combat HIV/AIDS, malaria, and other diseases |
| Goal 7 | Ensure environmental sustainability |
| Goal 8 | Develop a global partnership for development |

objectives contain clear numerical values, the last—reversing the loss of environmental resources—is left to broad interpretation. This inability to set targets or measure progress undermines not only the attempts to improve environmental sustainability but also efforts to meet all other MDGs.

This report addresses this shortcoming and suggests two new tools for policy makers to measure environmental sustainability and two new targets to meet. It also calls for more research into better ways of valuing environmental services such as pollination, maintenance of soil nutrients, and water purification. It draws upon a companion World Bank publication, *Where Is the Wealth of Nations?* (World Bank 2006). This provides a snapshot of all the assets—including natural, produced, human, and institutional capital—underpinning development in 120 countries. It reaches three main conclusions relevant to MDG-7:

- Natural resources constitute an extremely important share of the wealth of poor countries.
- Total wealth per capita is falling in many of the poorest countries as resources are depleted and their populations grow.
- The value of natural resources rises as incomes increase, suggesting development does not always mean environmental depletion.

Using these results, this report suggests two new indicators and targets:

- Genuine saving per capita (or the overall change in the real per capita wealth of a country) with the target of achieving positive savings by 2015.
- The value of natural wealth per capita, with the target of achieving stable or increasing levels of this value by 2015.

Adopting these indicators and targets should provide governments with the information and the direction to adopt the right policies—making the most effective investment in natural resource management, changing incentives to prevent overexploitation of the environment, and recognizing more clearly that natural resources can fund sustainable development, provided they are well managed.

The Evidence

Wealth, Growth, and the Role of Natural Resources

In *Where Is the Wealth of Nations?* the World Bank publishes what could be termed the *millennium capital assessment*. It estimates the monetary value of the range of assets—produced, natural, and intangible forms of capital—upon which development depends. While important gaps remain, this comprehensive snapshot of wealth for 120 countries at the turn of the millennium aims to deepen our understanding of the linkages among development outcomes and the level and composition of wealth. It measures on a country-by-country basis:

- *Total wealth*—estimated as future consumption over a generation (or 25 years), measured at present values.
- *Produced capital*—obtained from historical investment data.
- *Natural capital*—based on country-level data on physical stocks and estimates of profits or rents, based on world prices and local costs.
- *Intangible capital*—estimated as the difference between total wealth and the other forms of capital, it includes a wide array of assets such as human capital, quality of institutions, and governance (see box 2).

This approach has limitations. The data about some forms of natural wealth such as fish stocks and water resources are unavailable, as are figures for some kinds of environmental services. However, the approach still offers new and valuable insights into the relationship between natural capital and development. Examining the value of natural resources has a number of important results.

- First, the report shows that the value of natural capital per person rises as income levels increase (figure 1). This contradicts the received wisdom that economic development automatically leads to depletion of the environment.

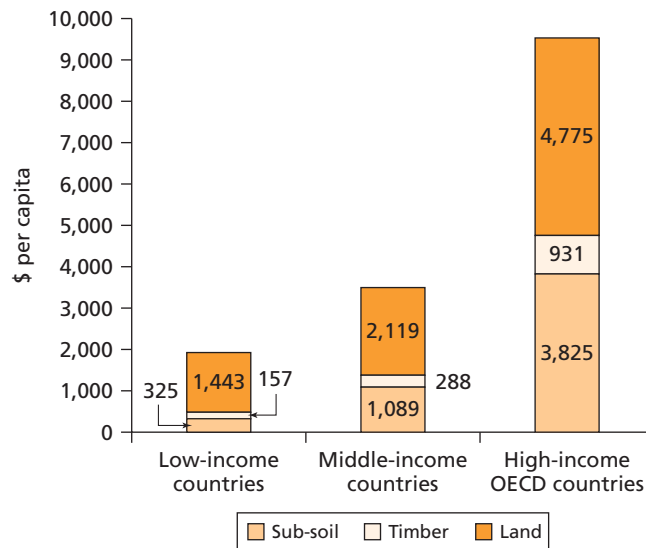
Box 2. Intangible Wealth

The bulk of wealth in all countries, from the richest to the poorest, is intangible wealth. *Where Is the Wealth of Nations?* shows that three factors account for 89 percent of intangible wealth:

- the rule of law
- education
- returns on exported human capital measured through remittances

Increasing the average stock of schooling by one year per person increases total wealth per capita by nearly \$840 in low-income countries, almost \$2000 in middle-income countries, and over \$16,000 in high-income countries. A one-point increase in the rule of law index (on a 100-point scale) boosts total wealth by over \$100 in low-income countries, over \$400 in middle-income countries, and nearly \$3000 in high-income countries.

Figure 1. Value of Natural Resources Per Person, 2000



Source: World Bank 2006.

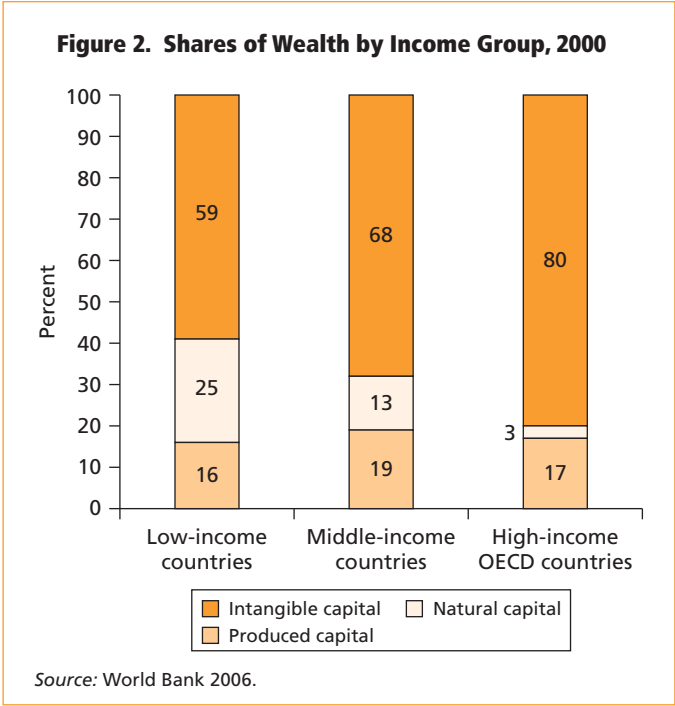
Table 1. Value of Natural Capital, 2000 (\$ per capita)							
Group	Natural capital (total)	Subsoil assets	Timber resources	NTFR	PA	Cropland	Pastureland
Low-income countries	1,925 100%	325 17%	109 6%	48 2%	111 6%	1,143 59%	189 10%
Middle-income countries	3,496 100%	1,089 31%	169 5%	120 3%	129 4%	1,583 45%	407 12%
High-income OECD countries	9,531 100%	3,825 40%	747 8%	183 2%	1,215 13%	2,008 21%	1,552 16%

Note: NTFR: Nontimber forest resources. PA: Protected areas. Oil states excluded. Dollar values at market exchange rates.
Source: World Bank 2006.

A breakdown of the different types of natural capital—including cropland and pastureland, timber resources, and protected areas—shows the critical importance of soil for low-income countries (table 1). With cropland and pastureland accounting for almost 70 percent of natural wealth in these countries, it is clear that maintaining soil quality is crucial to achieving sustainable growth. Soil quality also has a great impact on progress made toward other MDGs such as poverty, hunger, and child mortality.

- The importance of natural resources is also shown by analysis of the share of wealth by income group (figure 2). In all countries, intangible capital is, by far, the largest share. However, for the poorest countries, natural capital is more important than produced capital—again demonstrating how important natural resources are to those countries. This suggests that properly managing natural resources must be a key part of development strategies, particularly since the poorest households in those countries are usually the most dependent on these resources.

This analysis also shows how the share of natural resources in total wealth declines as incomes rise. This does not mean that these resources become less important or that they can be exploited indiscriminately. Rather, this demonstrates how intangible assets become more important as countries develop, with the productivity of their people increasing along with the quality of their institutions.



Both these findings underline the importance of environmental sustainability to growth. Economic growth is essential to the ability of low-income countries to meet the MDG targets, but growth will be illusory if it is mainly based on consuming assets such as forests, fisheries, and soil nutrients that underpin economies.

Natural Resources and Development

Natural resources are special economic goods because they are not produced. They are truly a gift of nature.

Natural resources play three roles in development.

- The first, most applicable in the poorest countries, is their role in providing the basis of subsistence.
- The second is as a source of development finance. Commercial natural resources can be important sources of profit and foreign exchange. Rents can be used to finance investments in other forms of wealth.
- The third is as a source of environmental services underpinning economies and human well-being.

Exhaustible resources, such as minerals and energy, once discovered, can only be depleted. Consuming rents from these resources is literally consuming capital. The prudent policy to adopt, therefore, is investing these rents into other forms of capital. There are no sustainable diamond mines, but there are sustainable diamond-mining countries where capital in one form—diamonds—is transformed into another form such as buildings, machines, or human capital.

Living resources, such as forests or fish stocks, are different and unique because they are potentially sustainable. They can yield sustainable profits or rents, which can be an important source of finance for development, provided the resources are properly managed. The efforts to address overfishing in Mauritania constitute an example of successful management to the ultimate benefit of the country's economy (see box 3).

The Practical Application of Sustainable Management

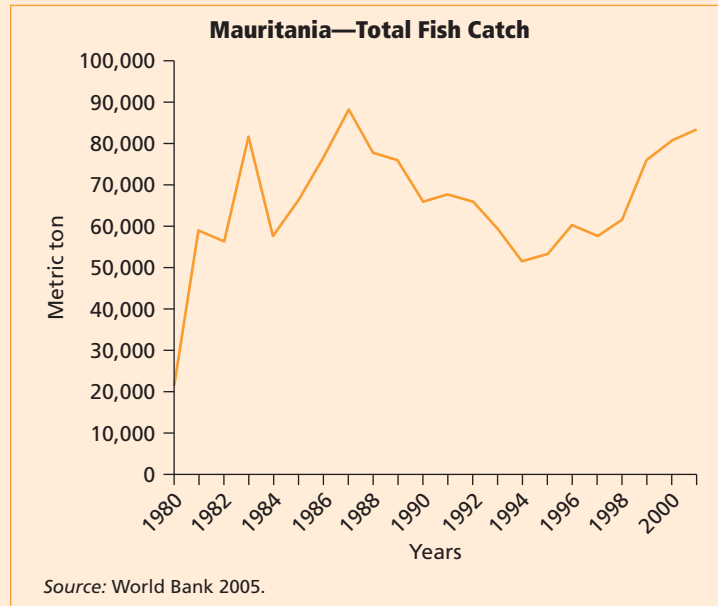
Sustainable management of living resources may be the optimal policy goal, but how is this achieved in practice? The need to maintain a balance

Box 3. Mauritania—Total Fish Catch

Mauritanian fishing grew remarkably in the early 1980s and was expected to be a major source of growth in the next two decades, generating jobs, foreign exchange earnings, and budget revenues. However, heavy overfishing and other problems led to a crisis, with sharply lower catches, threatening to undermine the country's growth prospects.

Conservation measures were a central part of an International Monetary Fund-supported adjustment strategy adopted in the 1990s. A series of reforms were introduced, including increased transparency and efficiency in allocating fishing rights, stronger surveillance of illegal fishing by both national and foreign operators, a new licensing system for foreign fleets, and fines for violators. The Mauritanian government also brought in ambitious tax reforms to improve competitiveness, eliminate trade distortions, and make taxation more transparent. This included eliminating export taxes for fish and improving the management of resources by introducing access rights for deep-sea fishing, licensing for pelagic fishing, and territorial rights for artisanal fishing.

These measures proved successful. By 2002, the fishing catch had increased again, contributing to an improvement in the overall economic performance of the Mauritanian economy. Fiscal and balance of payments targets were met, thanks also to high financial compensation under a new fishing agreement with the European Union, other tax reform, ongoing financial discipline, and an exchange rate policy encouraging external competitiveness.



between forestry and agriculture is a good example, since this remains a central concern in many developing countries, often driven by the increasing food needs of expanding populations. In economic terms, the optimal balance occurs when the value of net agricultural income per hectare is the same as the total economic value (TEV) of the forest. However, the TEV is a broad concept, which must include a wide range of economic activities such as the rents from sustainable timber production, the value of carbon sequestration, and the value of other services that forests provide, such as regulation of water services and biodiversity conservation.

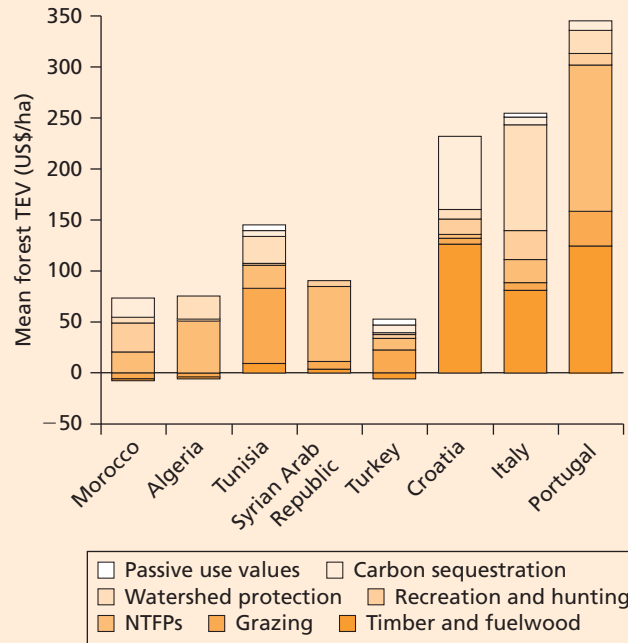
Sustainable management of natural capital requires clear and enforced property rights (individual or communal) to provide incentives for investment and long-term management of these resources. It also requires prices that reflect social costs and benefits of different management alternatives. Since markets will capture these only imperfectly, there can be grounds for public sector intervention by way of *green* taxes or by creating a system to pay for environmental services.

Valuing environmental services is crucially important (see box 4). The Millennium Ecosystem Assessment divides these services into provisioning services (such as food and fiber, obtained from agro-ecosystems), regulating services (such as the regulation of water flows by forests), cultural services, and supporting services (such as the support of nutrient cycling provided by micro organisms). For many of these services, providers and beneficiaries are distinct and rarely interact with each other. The consequence is that the services are underprovided and their value is not captured by market prices. For example, upland forest owners have no incentive to preserve watershed services that benefit downstream water users; therefore, upland forests are overexploited and their worth unmeasured. Many such environmental services are recognized in the analysis in *Where Is the Wealth of Nations?*, but not explicitly. For example, the value of cropland only implicitly accounts for the value of ecosystems in providing pollination services.

Box 4. Valuing Ecosystem Services

The Millennium Ecosystem Assessment has shown the myriad ways in which the world's ecosystems contribute to human well-being. This can be directly, by providing food or recreational activities, or indirectly, by purifying water. The figure shows the results of one attempt to comprehensively value the services provided by forests in Mediterranean countries.

Annual Flow of Benefits from Forests in Mediterranean Countries



Source: Croitoru and Merlo 2005.

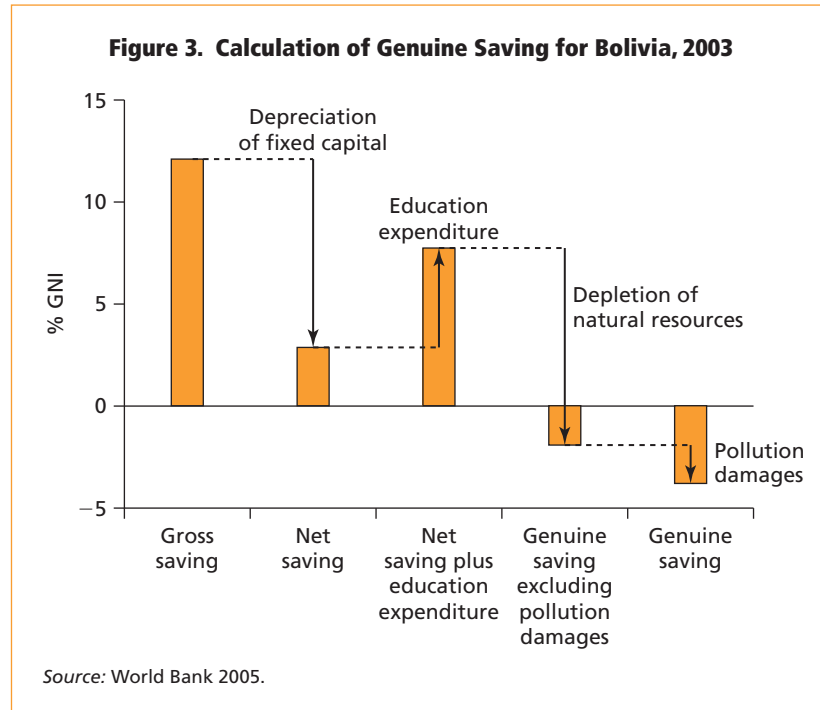
Typically, national economic accounts are both incomplete and misleading. They usually take into account only the timber benefits and some nontimber benefits. They also misattribute these benefits—water regulation benefits appear not as forest benefits but as high profits in downstream water-using sectors. Certain benefits may appear exaggeratedly high—logging rates that are far in excess of natural growth—while others do not appear at all.

These failures mean the real value of ecosystems is often seriously underappreciated, with the result that they are often converted to other, often less beneficial, uses that threaten both current and future well-being. The last few decades have seen many attempts to better value natural ecosystems. These approaches include measuring the willingness of consumers to pay the cost of substitutes for ecosystems or assessing the impacts of ecosystem change on productivity. Despite this progress, data limitations are a formidable obstacle to valuing ecosystems on a wide scale. The vast majority of studies have focused on valuing small parts of specific ecosystems such as water filtration services in Kampala, Uganda.

Genuine Saving—A New Tool

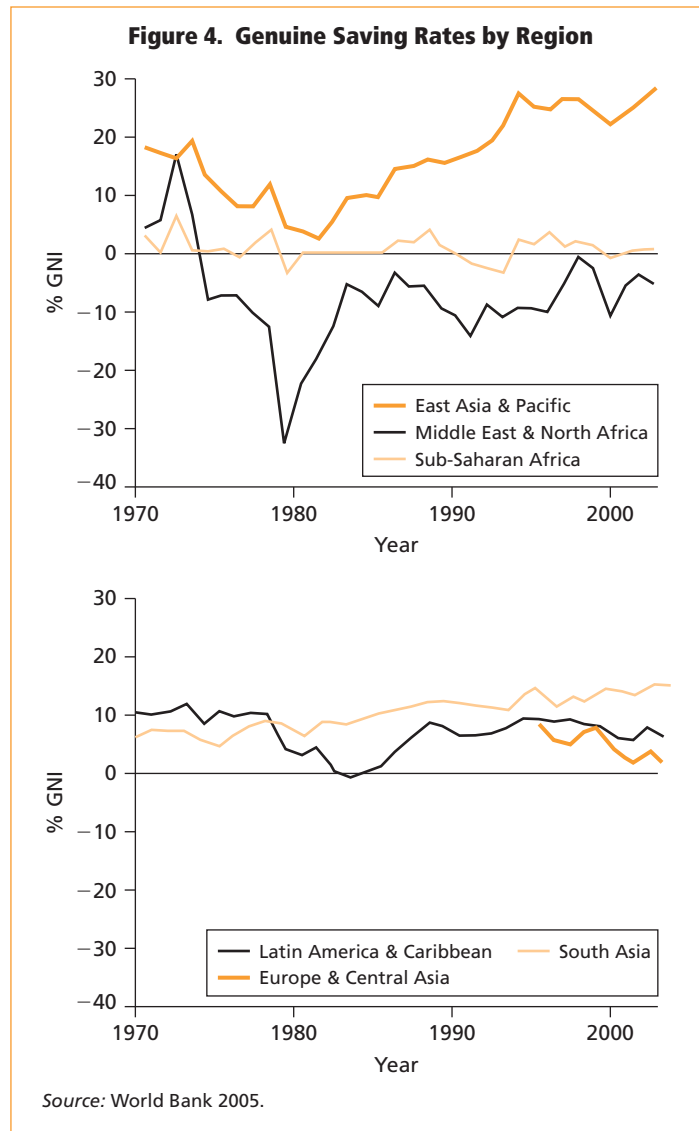
To develop policies for sustainable development, we must measure not just the total value of capital, but changes in this value. Such a broad measure of saving, which includes the depletion of natural resources, will indicate whether an economy is on a sustainable path.

Traditional gross saving is simply the amount of gross national income that is not consumed. Genuine saving looks much wider—including the depletion of minerals, energy, and forests, damage from global and local air pollutants, investments in human capital, and depreciation of produced capital. Figure 3 shows how genuine saving is calculated for Bolivia—a country that is failing to save sufficiently for the future.



Regional Trends

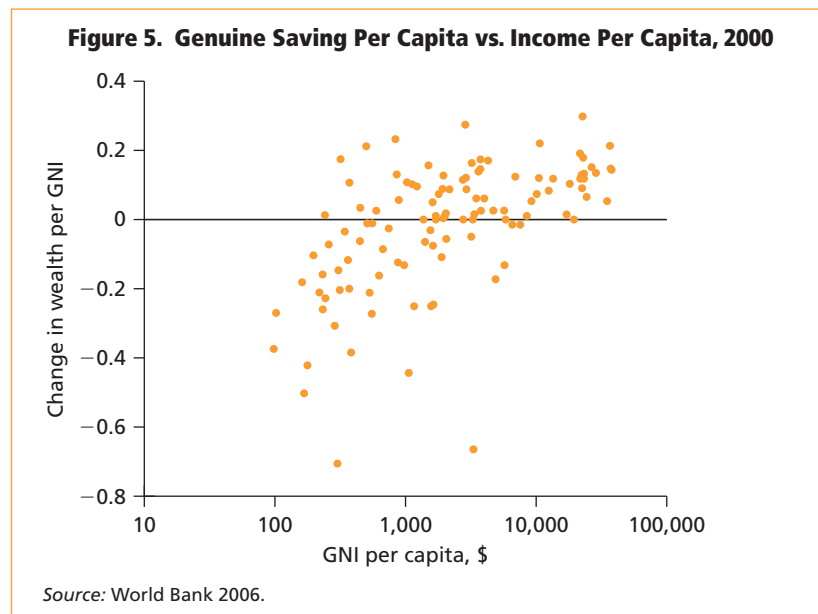
The regional trends in genuine saving over time shown in figure 4 tell a powerful story. The strong growth in saving in East Asia, particularly China, is particularly impressive, although a more complete measure taking account of pollution damages and soil degradation would show a more muted performance. The dependence of the Middle East and North Africa



on oil extraction is shown by their generally negative performances. Sub-Saharan Africa is shown to have a genuine saving rate of about zero when resource depletion is considered. South Asia has maintained a gradually rising level of genuine saving compared to the fluctuating saving rate of Latin America and the decline in saving in Eastern Europe and Central Asia.

Population growth is an important factor in wealth accumulation, particularly in those developing countries in South Asia and Sub-Saharan Africa where the highest population growth is expected. Unless the growth in total wealth exceeds the population growth rate, total wealth per capita will not increase. As figure 5 shows, most wealthy countries have positive rates of wealth accumulation per capita. However, people in most poor countries with incomes of less than \$1000 per capita have experienced declines in their average wealth.

The measure of genuine saving is most useful for developing countries that are heavily dependent upon their natural resources. *Where Is the Wealth of Nations?* suggests investments in produced capital, along with saving efforts to offset the depletion of natural resources, can increase well-being in low-income countries. Reducing pollution damage can increase saving rates in middle-income countries. The step from saving to investment is crucial—if investments are not efficient, then money is wasted, resulting in neither increased capital nor consumption.



The Role of Fiscal Policy

For countries with abundant natural resources, using the genuine saving measure highlights large fiscal issues for governments concerning revenues, expenditure, and boom-and-bust cycles. Dealing with these issues is not likely to turn finance ministers into environmentalists, but a sharper focus on the fiscal aspects of natural resources can have a substantial impact on economic performance. Box 5 shows how Botswana has successfully managed high natural-resource dependence.

Revenue issues. In principle, governments should tax natural resources to the point where the private sector is willing to risk its capital in their exploitation. If the natural resources of a country attract foreign tourists, substantial revenues could also be raised from taxes on entry and accommodation. However, if sectoral policies encourage overexploitation, revenues might not be sustainable.

Expenditures. Revenues from exhaustible resources should be efficiently reinvested in other assets to maintain national wealth. A broad view should be taken. For example, while spending on protected areas may not seem to make sense at first to treasuries, these protected areas may be attractive to tourists, so that investing in them could significantly boost tourism and its related revenues.

Fiscal boom-and-bust. Governments can be tempted to increase their expenditures when world prices for natural resources are high. However, when prices fall, it can be hard to rein in spending, leading to fiscal imbalances.

Fiscal space. Governments want the space or flexibility to spend on desirable projects without jeopardizing financial stability. Unfortunately, tax revenues from exhaustible resources do not fully increase fiscal space because a portion of these taxes represents the consumption of natural capital. The news that fiscal space is not as large as conventionally

measured may not be welcomed by some treasuries, but it will be heeded by prudent governments.

State-owned enterprises (SOEs): Common in the natural resources sector, these present risks of their own. They are often inefficient and accumulate financial liabilities. If the enterprises are off-budget, their liabilities are not factored into the government's fiscal stance. If they are on-budget, they often do not have the retained earnings to finance capital spending and risk under-capitalization.

Box 5. Botswana—Managing Resources Successfully

Since its first diamond mine was discovered in 1967, Botswana experienced strong and sustained growth and avoided the problems experienced by other resource-rich countries in Africa and Latin America. The recipe for this success has been a set of policy rules grounded in avoiding fiscal deficits. The government uses a Sustainable Budget Index (SBI) in order to ensure sustainability. This measures the ratio between consumption expenditures and nonresource revenues. As long as the SBI is less than one, the government can be sure that natural-resource capital is not being consumed. Botswana has had its problems. Public investment has often gone into low-growth sectors such as defense and agriculture, while it has crowded out private investment, slowing economic diversification. However, the overall fiscal strategy has worked. The government has avoided excessive spending in the good times and drastic spending cuts when diamond prices have fallen, as in the early 1980s and 1991.

Conclusions

Proper management of natural resources is critical to sustainable development and meeting all of the MDGs. Important messages have been brought out here:

- Land resources are key to sustainable development in the poorest countries.
- The importance of intangible capital emphasizes the need to invest in human capital and the rule of law.
- Revenues from exhaustible resources must be reinvested efficiently into other forms of capital.
- Sound property rights are an important basis for sustainable development.

At a more general level, the main findings are as follows:

- Natural resources play a central role in low-income countries, implying an important link between resource management and sustainable growth in these countries.
- There is a decline in wealth per capita in most poor countries. This means it is vital to consider genuine savings per capita when measuring sustainable growth.
- Even where poor and middle-income countries have increased wealth per capita, it is unclear that their natural resources are being used as wisely as possible. We cannot be certain that all natural assets can be replaced by produced assets or human capital. To measure progress towards MDG-7, it is therefore prudent to monitor the changes in natural wealth per capita.

Recommendations: Measuring Progress Toward MDG-7

This report, therefore, recommends that two new indicators and targets should be used to track progress on MDG-7:

- Genuine savings per capita, with a target of a positive saving rate by 2015.
- Value of natural wealth per capita, with a target of this being stable or increasing by 2015.

If used, these could provide governments with the tools to better achieve MDG-7 and the other MDGs.

For countries that are highly dependent on exhaustible resources, such as Botswana, it is probably not practical to maintain the total value of natural capital per person at constant or increasing levels. However, these countries should still consider the wider benefits, particularly the environmental services, that result from investing in other forms of natural capital.

This report makes a further recommendation. Work remains to be done in areas such as setting common valuation standards and gathering data to enable international tracking of the value of environmental services. An additional *stretch* goal for MDG-7 would be increasing research to set up inventories of environmental services, measuring indicators linked to services such as soil nutrient balances, and working toward better valuation of the services.

References

Croitoru, L., and M. Merlo. 2005. "Mediterranean Forest Values." In M. Merlo and L. Croitoru (eds.) *Valuing Mediterranean Forests: Toward Total Economic Value*. Wallingford: CABI Publishing.

Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Synthesis*. Washington, DC: Island Press.

UN Millennium Project. 2005. *Environment and Human Wellbeing: A Practical Strategy. Summary version of the report of the Task Force on Environmental Sustainability*. New York: The Earth Institute at Columbia University.

World Bank. 2005. *World Development Indicators 2005*. Washington DC: The World Bank.

World Bank. 2006. *Where Is the Wealth of Nations?* Washington DC: World Bank.