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2002

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The Environment and the Millennium Development Goals

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**We must spare no effort to
free all of humanity, and
above all our children and
grandchildren, from the
threat of living on a planet
irremediably spoilt by
human activities, and whose
resources would no longer
be sufficient for their needs.**

Paragraph 21, Millennium Declaration

What are the Millennium Development Goals?

At the Millennium Summit in September 2000, the states of the United Nations reaffirmed their commitment to working toward a world in which eliminating poverty and sustaining development would have the highest priority. The Millennium Development Goals, which grew out of the agreements and resolutions of world conferences organized by the United Nations in the past decade, have been commonly accepted as a framework for measuring development progress. The goals focus the efforts of the world community on achieving significant, measurable improvements in people's lives. They establish yardsticks for measuring results, not just for developing countries but for the rich countries that help to fund development programs and for the multilateral institutions that help countries implement them.

The first seven goals, directed at reducing poverty in all its forms, are mutually reinforcing. The eighth goal—global partnership for development—is about the means to achieve the first seven. Many of the poorest countries will need additional assistance and must look to the rich countries to provide it. Countries that are poor and heavily indebted will need further help in reducing their debt burdens. And all countries will benefit if trade barriers are lowered, allowing freer exchange of goods and services. The Millennium Development Goals framework—the complete list of the goals, targets, and indicators—is at the end of the booklet. The World Bank's companion booklet, "Millennium Development Goals 2002," assesses the prospects for each country in reaching the goals.

How does the environment relate to the Millennium Development Goals?

The environment is an essential component of the Millennium Development Goals. The Millennium Summit's Declaration dedicated a section to environmental protection, making explicit reference to climate change, desertification, biodiversity, and forest and water management. The Millennium Development Goals framework captures the environmental concerns in *Goal 7: Ensure environmental sustainability*. The targets associated with that goal refer to mainstreaming the environment in policy and programs, reversing the loss of environmental resources, and improving access to environmental services.

It makes sense to try to achieve the goals together, because of the many synergies among them. Addressing environmental issues would help to achieve the other goals, and achieving the other goals would help to ensure environmental sustainability.

The centrality of the environment to the Millennium Development Goals is reinforced by its strong linkages to the rest of the goals. Promoting nonfarm sources of income and technological

The Millennium Development Goals

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

improvements in agriculture is key to reducing income-poverty in rural areas. But it is difficult to imagine achieving this reduction where land is degraded and water absent. Reductions in child mortality will be more likely if households have access to adequate water supply, sanitation facilities, and modern fuels. Ready access to fuel and water lessens the time demands on women and girls, facilitating their engagement in productive activities and school attendance. Climate change will favor the spread of vector-borne diseases and increase the likelihood of natural disasters. Those disasters, in turn, reduce income and destroy the infrastructure for education and health. This booklet explores these linkages.

Environmental sustainability is central to the Millennium Development Goals and has strong linkages to many of the other goals.

But the environment is no silver bullet. Strong direct connections can be found with some of the goals, but not with all of them—for example, HIV/AIDS. Even when environmental interventions can contribute to achieving the goals, the interventions may not be always cost-effective. Additional efforts are needed in analyzing the linkages among the goals and developing a comprehensive and cost-effective plan to achieve them.



The poverty goal and the environment

Goal 1. Eradicate extreme poverty and hunger

Target: Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day.

Target: Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

The Millennium Development Goals reflect the multifaceted nature of poverty, with each goal illustrating a different aspect of poverty. The Millennium Development Goals framework is an attempt to operationalize a multidimensional approach to poverty, focusing on selected critical indicators. Since a number of environmental factors affect the different dimensions of poverty, environmental improvements may be fundamental in strategies and actions to reduce poverty and sustain development.

The first of the Millennium Development Goals addresses some of the major components of poverty: extreme poverty, and hunger and malnutrition. Measured by the \$1 a day consumption poverty line, in 1999 there were 490 million people living in extreme poverty in South Asia, 300 million in Sub-Saharan Africa, and 260 million in East Asia.

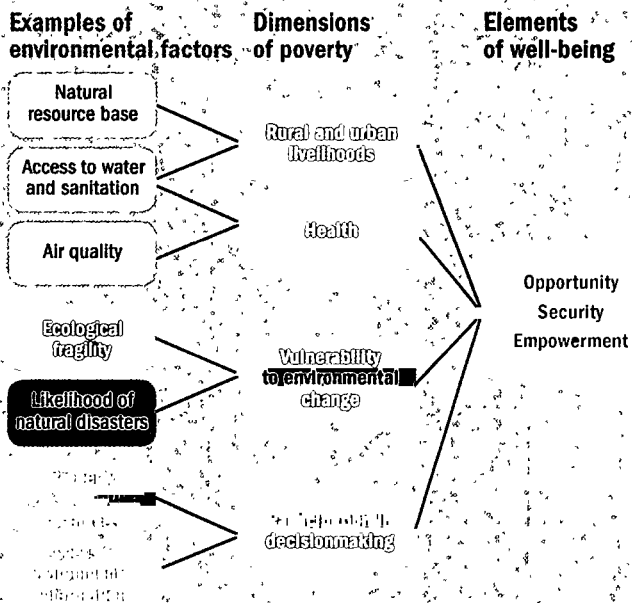
Extreme poverty and hunger are closely related to the livelihood and vulnerability of households. The next two pages explore these connections briefly. "Linking Poverty Reduction and Environmental Management," a joint publication of the Department for International Development, European Commission, United Nations Development Programme, and World Bank, offers more extended treatment.

Poverty is multidimensional

Traditionally, poverty has been defined on the basis of a household's income or consumption, taking this as the best proxy for welfare. Lately, the definitions are moving beyond this single dimension to include utility and capability-based concepts. These include health, education, security, political voice, discrimination, and inequality (in a country, region, or household). Not all of these measures are necessarily at work in every context, but generally each is needed to capture something missing in the others.

Environmental factors influence the different dimensions of poverty—affecting people's opportunity, security, and empowerment—in many different ways. Extreme income poverty and malnutrition can be taken as proxies for the many dimensions of poverty. In turn, lacking a sustainable livelihood and good health, being vulnerable to environmental change, not being in control of decisions related to the environment—all contribute to extreme income poverty and malnutrition.

Environmental links to the dimensions of poverty



Source: J. Bucknall, C. Kraus, and P. Pillai. 2001. "Poverty and Environment." Environment Strategy Paper World Bank, Environment Department, Washington, D.C.

Poverty, livelihoods, and the environment

Natural resources are important for subsistence production and commercial activities. They can be a primary source of livelihood or a supplement to a household's daily needs and income. The poorest countries still depend heavily on natural resource exports such as agricultural commodities—cocoa, coffee, sugar—and oil, gas, and minerals. Sustainable management of these natural resources is important to sustaining export revenues.

Poor rural households often derive a large share of their incomes from natural resources. In addition, the poor may benefit from the commercial exploitation of natural resources through employment and the generation of revenues for poverty reduction.

Poor people are more affected by natural resource degradation because of their limited assets and their greater dependence on common property resources for their livelihoods. For example, they can do little to compensate for declining fertility while better-off farmers can afford to use more fertilizer.

Natural resource degradation is undermining the livelihoods and future livelihood opportunities of large numbers of the poor. This is most evident in agricultural systems, which underpin the livelihoods of the vast majority of the rural poor. The degradation of soil and water resources is a major threat to improving agricultural productivity, the cornerstone of poverty reduction strategies in many countries. Many of the rural poor also depend heavily on forest products. So fighting extreme poverty and hunger requires sustainable management of land, water, and biodiversity resources.

Ecosystem services and livelihoods

Ecosystems provide essential "services" that contribute to the productive activities of rural and urban populations and to the livelihoods of the poor. Examples include:

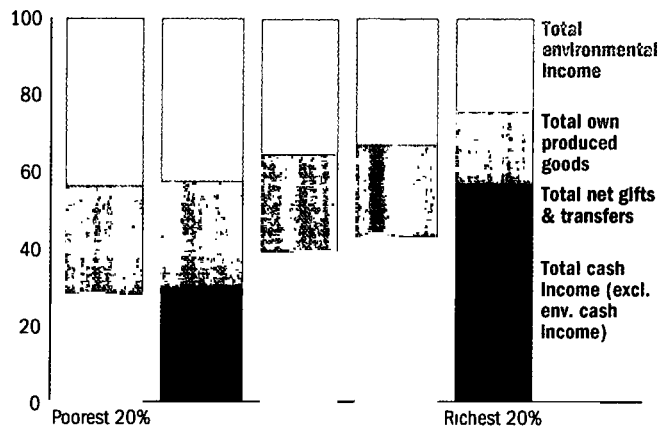
- Provision of natural habitat for species (pollinators, pest predators, soil organisms) important to agricultural productivity
- Watershed protection and maintenance of hydrological regimes, including recharging water tables and buffering extreme hydrological events
- Maintenance of soil fertility through storage and cycling of essential nutrients

Source: Department for International Development, European Commission, United Nations Development Programme, and World Bank, 2002, "Linking Poverty Reduction and Environmental Management."

The poorest households in rural Zimbabwe derive over 40 percent of their income from environmental sources.

Income from environmental sources in rural Zimbabwe

Percentage of income



Source: W. Cavendish 1998 "The Complexity of the Commons: Environmental Resource Demands in Rural Zimbabwe" WPS/99-8 Oxford University, Centre for the Study of African Economies, Oxford

Poverty, vulnerability, and the environment

Vulnerability to environmental change, encompassing both natural disasters and more gradual processes of environmental degradation, is a key dimension of poverty. By exacerbating economic deprivation in the short term, environmental disasters can compromise long-term welfare by forcing affected households to sell off assets that would otherwise be used to meet future needs and contingencies.

The poor are most vulnerable to environmental change. Why? Because the majority of the rural poor live in ecologically fragile areas, and the urban poor live and work in environments with high exposure to environmental hazards. The poor suffer the greatest relative losses of income and assets when disaster strikes, and are in the weakest position to cope and adapt.

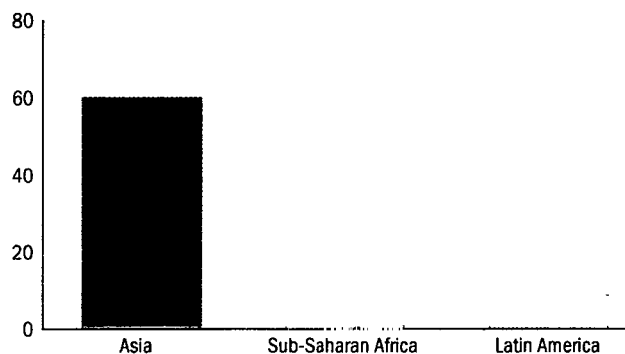
Resource mismanagement and environmental degradation increase the frequency and impact of natural hazards, such as droughts, floods, and forest fires. For example, mangrove degradation has aggravated the impact of typhoons in coastal Vietnam, while climate change is increasing the frequency of extreme weather events.

The impact of natural hazards can affect many of the targets included in the Millennium Development Goals' framework. For example, when Hurricane Mitch hit Honduras, the number of poor people rose by 165,000. The poorest lost 18 percent of their assets, 29 percent of crops were lost, and 20 percent of hospitals and education centers were affected. Environmental degradation in Honduras played a part, with a several-fold increase in landslide occurrence due to deforestation.

The poorest people live in ecologically fragile areas, making them vulnerable to environmental shocks and stresses.

The poorest live in ecologically fragile areas

Percentage of the poorest living on fragile land



Source: M. Leach and R. Mearns. 1991. "Poverty and Environment in Developing Countries: An Overview Study." Report to Economic and Social Research Council and Overseas Development Administration, United Kingdom.

Hurricane Mitch hit Honduras in late 1998, reversing the trend of income-poverty reduction, particularly extreme poverty.

Extreme income poverty effects of Hurricane Mitch in Honduras

Year-to-year variation in the percentage of population living in extreme poverty



Source: Government of Honduras. 2001 "Poverty Reduction Strategy Paper"

The gender and education goals and the environment

Goal 2. Achieve universal primary education

Target: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.

Goal 3. Promote gender equality and empower women

Target: Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015.

The second and third Millennium Development Goals refer to education and gender. While the education goal can in principle be related to a well-defined sector, the gender goal is cross-cutting. The environment links to these goals—particularly education—are more tenuous than for the other goals.

The targets corresponding to the gender and education goals are closely related, referring to education for all—boys and girls alike. Primary net enrolment in developing countries was 82 percent in 1998, up from 78 percent in 1990. But a gender gap in enrolment remains at all levels of education. In 1998 the female to male ratio was 0.87 in primary education and 0.82 in secondary education. So, eliminating the barriers to girls' schooling is essential to attaining both goals.

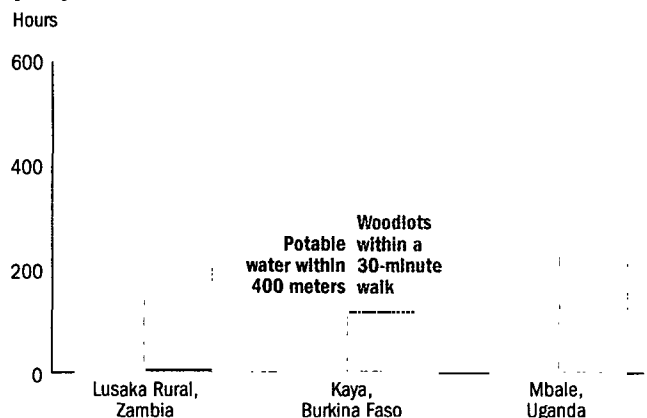
Beyond the gender target, the Millennium Declaration recognizes that promoting gender equality and empowering women are effective ways to combat poverty, hunger, and disease, stimulating development that is truly sustainable. Three areas are considered under this goal—gender disparity in education, women's access to employment opportunities outside agriculture, and women's access to political decisionmaking. Environmental links to these determinants of gender equality and women's empowerment include the availability of water and energy sources, access to natural resources, and the burden of environmental health threats.

Barriers to girls' education and women's empowerment

Entrenched gender biases and gender divisions of labor in the household and the community are important barriers to achieving universal education for girls and women's empowerment. So are the limited opportunities to participate in the formal economy. In this context, the need for women and girls to spend long hours gathering water or fuel is an impediment to reaching the education and gender goals. Many hours devoted to these responsibilities often mean that women have less opportunity than men to participate in market-based work or to earn income independently. For adolescent girls, who commonly share responsibility for household tasks, these activities often come at the expense of schooling. Unsustainable management of such natural resources as water and forests means that this burden is increasing for many girls and

In Burkina Faso, Uganda, and Zambia, women and girls could save hundreds of hours a year if walking times to sources of fuel and potable water were reduced to 30 minutes or less.

Average potential time savings per household per year



Source: I. Barwell. 1996. *Transport and the Village*. World Bank Discussion Paper 344. Africa Region Series. Washington, D.C.

women. Investments in environmental infrastructure can free women to participate in other activities, whether in income generation or community affairs, and encourage more schooling for girls.

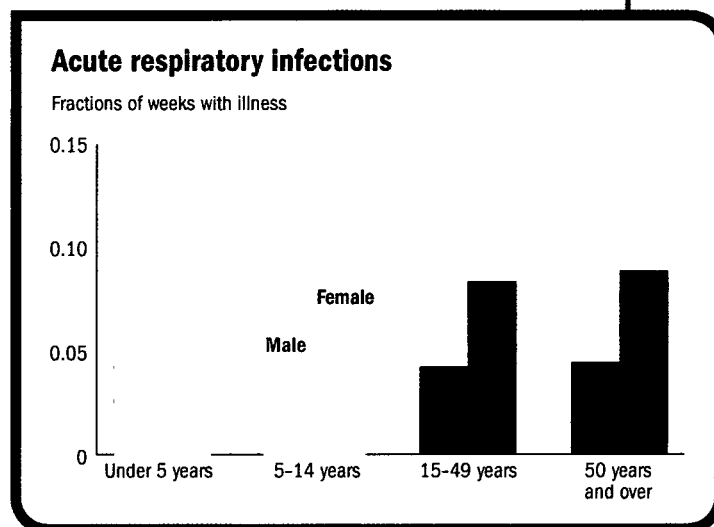
Gendered access to natural resources

The positive correlation between women's access to natural resources and their improved position in the household and the community is widely documented across rural societies in developing countries. For example, access to land has positive effects on access to credit, integration in the mainstream rural economy, and participation in community organizations. Enhancing women's access to natural resources would greatly contribute to their empowerment.

The gender gap in environmental health

Women disproportionately suffer acute respiratory infections, the leading cause of the global burden of disease. Respiratory diseases in developing countries are associated largely with exposure to indoor air pollution, especially to particulates from the combustion of biomass—wood, charcoal, crop residues, and dung. In addition to saving time, access to modern fuels would reduce the gender gap in environmental health.

Children and women in central Kenya are disproportionately affected by acute respiratory infection, caused by prolonged exposure to indoor air pollution from the combustion of biomass.



Source: M. Ezzati, H. Saleh, and D.M. Kammen. 2000. "The Contributions of Emissions and Spatial Microenvironments to Exposure to Indoor Air Pollution from Biomass Combustion in Kenya." *Environmental Health Perspectives* 108 (9): 833-40.

The health goals and the environment

Goal 4. Reduce child mortality

Target: Reduce, by two-thirds, between 1990 and 2015, the under-five mortality rate.

Goal 5. Improve maternal health

Target: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

Goal 6. Combat HIV/AIDS, malaria, and other diseases

Target: Have halted by 2015 and begun to reverse the spread of HIV/AIDS.

Target: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Improving health implies delivering health care services and addressing the causes of ill health. Recent estimates suggest that an additional 0.1% of rich country GDP can deliver quality health care services in the developing world.

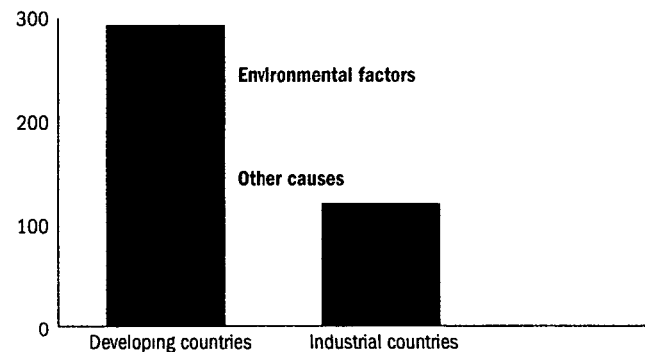
On causes, the environmental dimension is prominent, particularly for children under five: 20 percent of the burden of disease in developing countries is linked to environmental conditions, including insufficient and unsafe water, lack of sanitation, disease vectors such as mosquitoes, and indoor and outdoor air pollution. Dealing with the environmental causes of death and disease is highly cost-effective, yielding other benefits as well, including reduced time spent fetching water.

The burden of disease due to major environmental health risks is comparable to that from malnutrition and larger than that from other preventable risk factors and groups of disease. Every year in developing countries more than 7 million people die prematurely from environment-related diseases. Three million people die prematurely from water-related diseases, and two million people from exposure to stove smoke inside their homes. It is the poor—without access to safe water, sanitation, and clean fuels—who are the victims. Another one million people die from urban air pollution, and one million deaths can be attributed to vector-borne malaria.

Environment-related diseases make up a major share of the burden of disease in developing countries.

The burden of environmental disease

Disability-adjusted life years lost per million people (thousands)

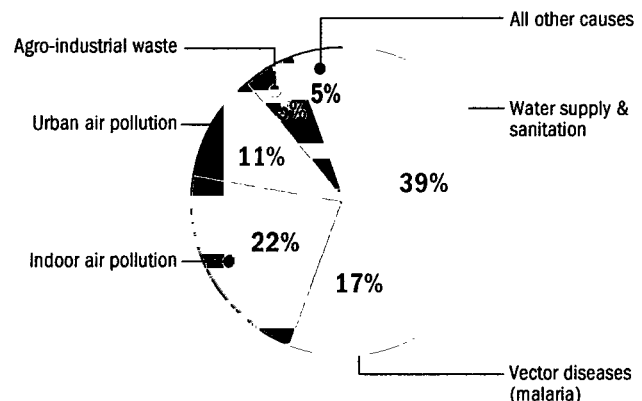


Source: K. Lvovsky. 2001. "Health and Environment." Environment Strategy Background Paper 1. World Bank, Environment Department, Washington, D.C.

Polluted air and water and the lack of sanitation are the major environmental factors contributing to the burden of disease in developing countries.

Contributors to the burden of environmental disease in developing countries

Percent of total disability-adjusted life years



Source: K. Lvovsky. 2001. "Health and Environment." Environment Strategy Background Paper 1. World Bank, Environment Department, Washington, D.C.

Reducing child mortality

Children the world over are the greatest victims of environmental degradation, despite the great strides made over the past 10 years in improving both children's well-being and the environment. Children under five bear 40 percent of the burden of environmental disease while representing only 10 percent of the population. Two of the leading causes of child mortality are diarrhea and acute respiratory infections, diseases largely influenced by environmental conditions.

Improving environmental conditions will be a key component of any strategy to reduce child mortality. Acute respiratory infections are largely due to indoor air pollution, while diarrhea is related to inadequate hygiene, water supply, and sanitation. So, interventions that help households move up the energy ladder and gain access to safe drinking water and sanitation are critical in reducing child mortality.

Combating malaria

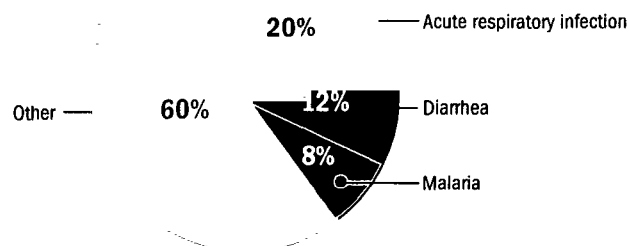
Malaria kills one million people a year, 90 percent of them in Africa. Even though it is not nearly as prevalent in other regions, the disease ranks third globally among all environmental health threats. Today, 40 percent of the world's population—mostly those living in developing countries—is at risk from malaria.

As a vector-borne disease, malaria is affected by a range of environmental factors. Stagnation of water for long periods of time creates conditions favorable to mosquitoes, and the increase in temperatures associated with climate change is expanding the area of influence of the vectors. Although nonenvironmental interventions, such as providing bed nets, may be cost-effective in fighting malaria, environment-related interventions devised for other purposes—such as avoiding climate change, or keeping up irrigation, drinking water, and sanitation infrastructure—will provide benefits in reducing malaria's burden.

Forty percent of under-five mortality is due to diseases associated with environmental factors.

Causes of child mortality

Deaths among children under five, global, 1999

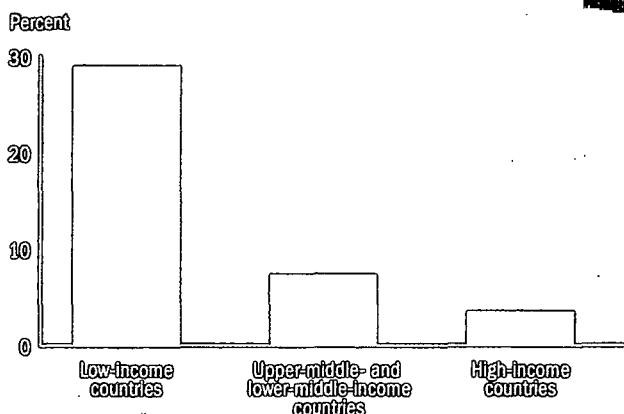


Source: World Health Organization

Indoor air pollution

Exposure to high levels of indoor smoke is associated with pregnancy-related problems, acute respiratory infections in children under five, chronic lung disease, and blindness. More than half the world's households cook and heat using traditional fuels in inefficient stoves without proper ventilation, killing two million people every year in developing countries, mostly children and women.

Traditional fuel as a percent of total energy use



Source: United Nations (data for 1997).

The environment goal: ensure environmental sustainability

Goal 7. Ensure environmental sustainability

- Target: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources.
- Target: Halve, by 2015, the proportion of people without sustainable access to safe drinking water.
- Target: Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.

If the Millennium Development Goals are to be attained—and just as important, maintained—it is essential that countries choose a sustainable development path. Achieving sustainability means ensuring that current actions do not lead to future declines in human well-being. This requires managing the broad range of assets—human capital, physical capital, and natural capital—that underpin development.

The attainment of Goal 7 will help to ensure that future generations enjoy the benefits from development and the achievement of the other Millennium Development Goals. The goal comprises three targets referring to mainstreaming the environment in policy and programs, reversing the loss of environmental resources, and improving access to environmental services, with special reference to slum dwellers.

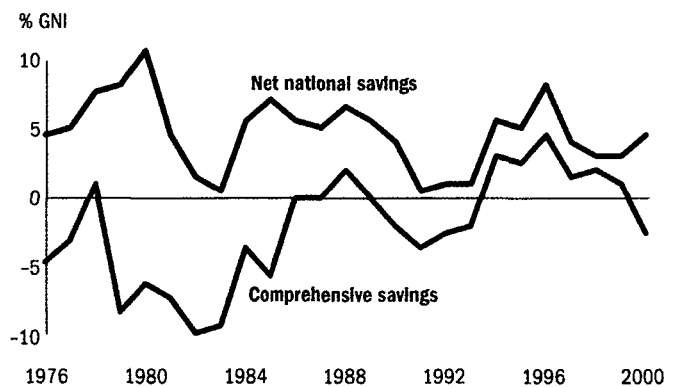
A measure of sustainability: comprehensive savings

Just as households that are running down their bank accounts or selling assets to maintain consumption are not sustainable, the same can be said for countries. At the national level the best measure of whether assets are being built up or run down is the savings rate.

A comprehensive measure of saving indicates the true rate of asset accumulation in an economy after taking into account the investments in human capital, the depreciation of physical capital, and the degradation and depletion of environmental resources. Negative comprehensive savings rates imply that total wealth is in decline. And policies leading to persistently negative savings are by definition unsustainable.

For Sub-Saharan Africa, traditional measures of saving have been positive. But when environmental degradation and pollution are taken into account, the picture is different. Sub-Saharan Africa has predominantly been on an unsustainable path since 1975.

Savings gap in Sub-Saharan Africa



Source: World Bank.

Environmental Resources

Target: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

This target recognizes that the environment has too often been overlooked by policymakers as a key resource for sustainable growth and poverty alleviation, urging that it be integrated into decisionmaking. The loss of environmental resources has implications for the welfare of the current generation and for the ability of future generations to maintain and improve welfare.

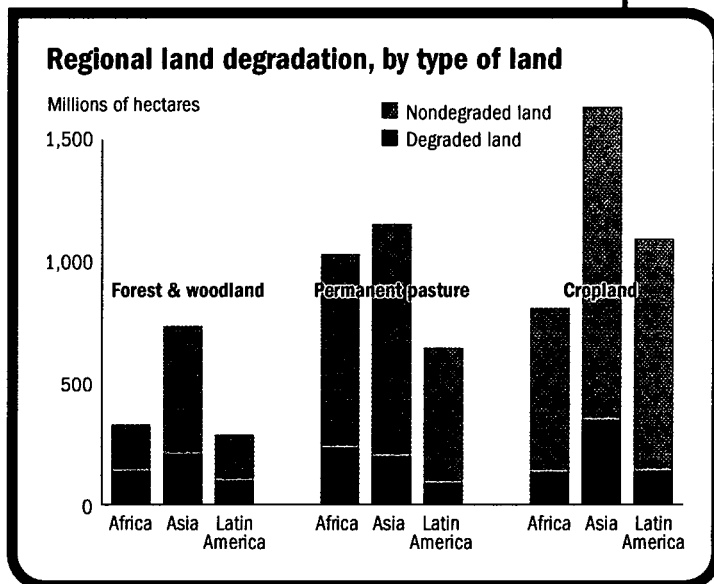
Because the target is wide ranging, the focus here is on a few important natural resources now being degraded or polluted or at risk of further deterioration: land, water, forests, biodiversity, clean air, climate change, and ozone depletion. Not comprehensive, the list omits some issues important to some countries, such as coastal degradation.

Land degradation

Land degradation, especially that of drylands, has become a global problem. Nearly 2 billion hectares of cropland, pastures, and forests worldwide have been degraded over the past 50 years. Various sources suggest that 5–10 million hectares are lost annually to severe degradation, with resulting impacts on agricultural yields.

Desertification—land degradation in drylands—causes economic instability and political unrest in the areas affected, putting pressures on the economy and the stability of societies outside the affected areas. More than one million people are at risk from desertification. Productivity losses are 10–25 percent on moderately degraded cropland and 25–50 percent on rangeland. The impacts fall disproportionately on poor people, who often are more reliant on agriculture and less able to purchase fertilizers and other inputs. Land degradation has not affected the global food supply, but it has had

Large shares of forest, pastures, and cropland have been degraded over the past 50 years.



Source: S. J. Scherr, and S. Yadav. 1996. "Land Degradation in the Developing World: Implications for Food, Agriculture, and the Environment to the Year 2020" Food Agriculture and the Environment Discussion Paper 14 International Food Policy Research Institute, Washington, DC.

a dramatic effect on specific areas of the world, where it poses a serious threat to food production and rural livelihoods.

Efforts to tackle land degradation must be linked to measures fostering broader economic and social change, to overcome the conditions that have resulted in degradation. The sustainable management of land resources will help achieve Goal 1 by increasing the incomes of the poor and reducing threats to food production in vulnerable areas. Land degradation also contributes to biodiversity loss as habitats are reduced, and to climate change.

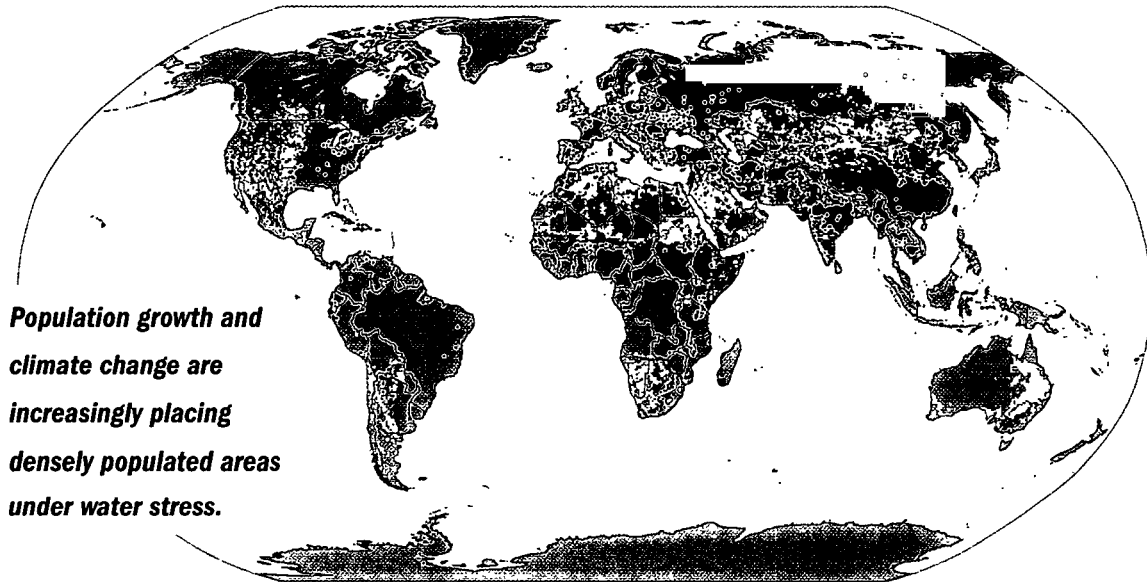
Water resources

The challenges for sustainable water management are formidable. While the world population tripled in the past century, the aggregate use of water increased sixfold. Some rivers no longer reach the sea. Half of the world's wetlands disappeared in the past century. A fifth of fresh-

Areas suffering severe water scarcity

Population in areas of relative water scarcity

Sparsely populated areas Moderately populated areas Densely populated areas



Source: Produced by the World Bank using data from C.J. Vorosmarty, P. Green, J. Salisbury, and R.B. Lammers, 2000, "Global Water Resources: Vulnerability from Climate Change and Population Growth," *Science* 289 (5477): 284-88

water fish are endangered or extinct. Subsoil water is being mined, and many aquifers are turning salty.

The World Commission on Water estimates that water use will increase by 50 percent in the next 30 years. It also estimates that half the world's people, mostly in the developing regions of Africa, the Middle East, and South Asia, will be under severe water stress by 2025. Current use is degrading water sources through the erosion of upper watersheds, depletion of aquifers, and pollution of ground and surface water. And due to climate change, most areas will experience bigger year-to-year variations in precipitation.

Meeting future needs for water will require substantial improvements in managing water sources. Delivering water to farmers, industry, and households while maintaining water's ecological functions will present major challenges. Inappropriate pricing policies have led to massive waste but provided few benefits to poor

people, who usually lack access to water connections. Managing water across subnational regions and across national boundaries will grow in importance. Institutional frameworks and management instruments, including pricing and regulatory reform, will be required. And the development of infrastructure will need a long-term perspective.

Sustainable rural development and agricultural growth, keys to achieving Goal 1, require sustainable irrigation. This means moving from an era of expansion and construction to one of intensification and better management. It means increasing the productivity of water and infrastructure. It means developing a realistic, sequenced approach to cost recovery. It also means scaling up water user associations, which have been remarkably successful. And it means reforming the formal irrigation institutions, especially through private sector participation.

Ensuring that poor households get an adequate supply of water, in both quantity and quality, will contribute to achieving the gender, education, and health goals. For example, only with sufficient amounts of water can handwashing practices change.

Biodiversity and forest resources

Biological diversity—or biodiversity—is the term given to the variety of life on Earth and the natural patterns it forms. This diversity is often understood as the wide variety of plants, animals, and microorganisms. But it also includes genetic differences within each species and the variety of ecosystems that occur in deserts, forests, wetlands, mountains, lakes, rivers, and agricultural landscapes.

Biodiversity provides many goods and services that sustain our lives. Purifying air and water. Renewing soil fertility. Cycling nutrients. Pollinating plants. Controlling pests. Supplying raw materials for pharmaceuticals. Providing aesthetic pleasure. Moderating the Earth's climate.

Local communities benefit from biodiversity in many ways—say, from a forest's timber, fuelwood, honey, mushrooms, and herbs. The international community also benefits—say, from carbon sequestration and pharmaceutical applications of biological compounds.

Although biodiversity provides significant economic and social benefits, it often is not protected or managed sustainably. Human activity has reduced the abundance and distribution of species, resulting in genetic erosion and greater risk of extinction. The causes of the loss of biodiversity are diffuse, mostly arising as secondary consequences of agriculture, forestry, fishing, water supply, transport, and urban development.

Carefully designed institutions are a prerequisite for capturing the full value of biological resources, avoiding their overexploitation.

Protected areas

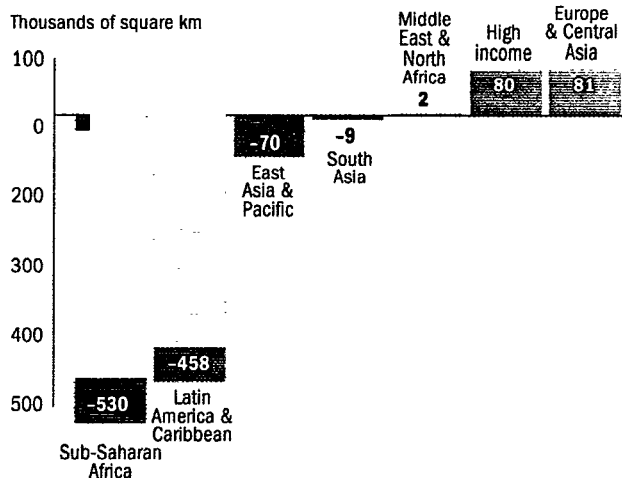
The number and size of protected areas indicate the protection of habitats and the efforts by governments. Although registered parks are not always fully protected in practice, some evidence suggests that even "paper parks" contribute to the conservation of biodiversity. According to the World Conservation Monitoring Centre, the proportion of the world's area under protection increased from 7.5 percent in 1990 to 9.5 percent in 2000, from 1 billion hectares to 1.28 billion.

Forests—small gains, large losses

Forests have a major role to play in poverty alleviation and sustainable economic growth, through the provision of forest products and ecological services. Of the world's 1.2 billion extreme poor—those living on \$1 or less a day—90 percent depend on forest resources. Forests help protect water sources, reduce the risks of such natural disasters as landslides and flooding, and are home to at least 80 percent of the remaining terrestrial biodiversity.

Cutting forests can sacrifice these benefits. It can also accelerate climate change, as additional carbon is released into the atmosphere. The last decade has witnessed continuing deforestation in developing countries.

Change in forest cover, 1990–2000



Source: Food and Agriculture Organization and World Bank estimates.

But biodiversity conservation still needs to be financed, through both protective expenditures and measures to compensate communities that may have to restrict their exploitation of natural areas for the benefit of the world.

Clean air

While most developed countries have recently made good progress in addressing urban air pollution, clean air can no longer be taken for granted in the developing world. Indeed, the greatest urban air pollution is found in China, India, and cities in Asia and Latin America.

Pollution from transport sources is a major concern. Vehicular traffic has expanded rapidly in the last three decades, in many developing countries 10-fold or more. Pollution from industrial sources is another key component of urban air quality management. Construction, refuse burning, biomass burning for heating and cooking, and naturally occurring dust also contribute to urban air pollution.

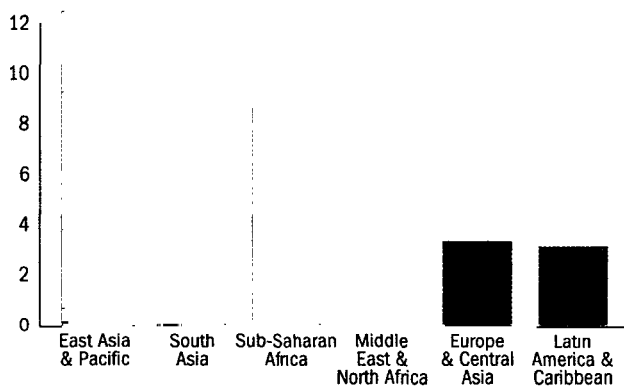
Fuel combustion inflicts considerable damage. There are adverse health effects of exposure to air pollution in urban areas (increased respiratory illness and premature deaths). There are reductions in visibility and increases in soiling. And then there are the effects on global climate change. The largest share of environmental damage is associated with the impacts of pollution on human health. Every year an estimated 0.5–1.0 million people throughout the developing world die prematurely from respiratory and other illnesses associated with urban air pollution, and millions more suffer from them. Poor people bear the brunt. They often live in densely populated neighborhoods, close to traffic corridors or industries, where garbage is burnt nearby. And they are more likely to travel in open vehicles or walk and otherwise spend more time outdoors.

Subsidies, mispricing, and inadequate taxation of environmentally damaging products have

Air pollution imposes a heavy burden on the health of urban populations throughout the developing world.

The burden of urban air pollution

Disability-adjusted life years per 1,000 urban population



Source: World Bank staff estimates.

traditionally sent the wrong incentives for preventing and combatting air pollution. Although regulation will continue to be important, measures that create awareness and provide incentives to consume and produce in an environmentally responsible way must become the policy instruments of choice.

Global environmental issues

Many ecological services are global public goods and their degradation affects people across the world. Some of the issues already covered in this booklet have a global public goods aspect, such as biodiversity conservation, or are global in extent, such as land degradation. Here the focus is on climate change and ozone depletion, two global commons issues directly affecting the maintenance of major parts of the Earth's systems. Addressing them effectively requires coordinated international action.

Climate change

Human activities have increased the atmospheric concentrations of greenhouse gases since the pre-industrial era, changing the Earth's climate. While the exact impacts of climate change are unknown, projections indicate that it will pose major development challenges for most developing countries.

Many less developed regions are especially vulnerable to climate change, and within these countries the poorest of the poor are likely to suffer most. Climate change is projected to increase the threats to human health, predominantly within tropical and subtropical countries. In some, even small changes in temperature could have a devastating impact on agricultural output, with attendant consequences for food security. Similarly, changes in precipitation patterns associated with climate change could adversely affect the availability and quality of water, especially where scarcity or flooding is already a problem. Rising sea levels could displace millions of people from low-lying areas of the Ganges River and the Nile delta and threaten the existence of small island states. Climate change will also increase the frequency of extreme weather events, increasing the vulnerability of the poor.

Averting climate change requires major reductions in emissions of greenhouse gases. In the Millennium Declaration the international community committed itself to making every effort to implement the Kyoto Protocol, which sets precise targets for reductions in greenhouse gases.

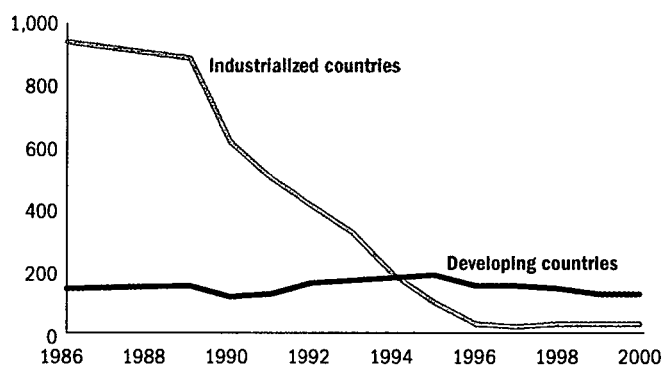
Ozone layer depletion

The ozone layer—ozone molecules in the stratosphere—is a naturally occurring concentration that filters the sun's ultraviolet radiation. But it has been depleted by human processes—the release of chlorofluorocarbons (CFCs) and other

International cooperation, mobilized through the Montreal Protocol, is successfully tackling the problem of ozone depletion.

Global consumption of chlorofluorocarbons controlled under the Montreal Protocol

Thousands of tonnes



Source: United Nations Environment Programme.

ozone-depleting substances widely used in refrigerators, insulating foams, and solvents. The depletion allows more radiation to reach Earth, with severe consequences for human health, plants, and marine ecosystems.

The Montreal Protocol on Substances that Deplete the Ozone Layer, signed in 1987, has proven successful in progressively reducing the emissions of human-made ozone depleting substances by ceasing their production and consumption. With the Montreal Protocol, the total consumption of CFCs worldwide has dropped from about 1.1 million tons of ozone depleting substances in 1986 to about 150,000 tons in 1999. The complete phase-out of these substances is scheduled for 2040. The benefits associated with implementation of the protocol add up to some \$460 billion in reduced damage to fisheries, agriculture, and materials. In addition, more than 20 million cases of skin cancer and nearly 130 million cases of cataracts will be avoided.

Water and Sanitation

Target: Halve, by 2015, the proportion of people without sustainable access to safe drinking water

While water supply and access to safe drinking water receive considerable attention at the international level, sanitation problems are seldom mentioned. Yet water supply issues are highly interlinked with those of sanitation, which evidence suggests to be at least as important as water supply in preventing disease. Because many of the health benefits from access to water cannot be realized without improving access to sanitation, it is considered part of this target.

Although an enormous number of additional people gained access to services in the 1990s, the number who now lack access to adequate water supply and sanitation services remained practically the same due to the growth in global population. As a result, at the beginning of 2000 a sixth of the world's people lacked access to improved water supply and two-fifths lacked access to improved sanitation.

Lack of access to adequate water and sanitation has considerable health and economic costs for households, with consequences for national economies and the environment.

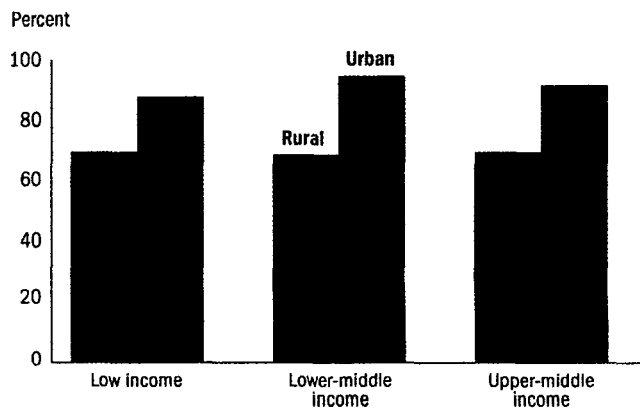
It contributes to illness and deaths, especially in children. Every year 2.2 million children under five die from diarrhea—closely linked to inadequate access to safe water and sanitation. In addition, almost half the people living in developing countries suffer from diseases caused either directly or indirectly by the consumption of contaminated water, inadequate sanitation, and improper hygiene practices. In addition to diarrhea, these include intestinal infections, trachoma blindness, cholera, and schistosomiasis.

Improving access is crucial in reducing illness and death among children under five. Estimates of the World Bank's Environment Department suggest that achieving the water

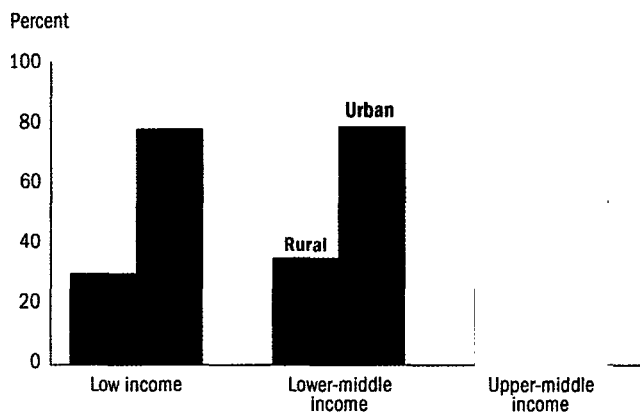
The rural gap in water supply and sanitation

According to the World Health Organization and UNICEF, access to improved water sources increased from 79 to 82 percent over the last decade, and access to improved sanitation from 55 to 60 percent. But these global figures hide significant urban-rural disparities throughout the world.

Access to improved water



Access to improved sanitation



Source: World Health Organization.

target would save the lives of 400,000 children a year while halving the proportion of people without access to sanitation would save the lives of 550,000 children a year.

Improved water supply and sanitation also save cash and time, adding convenience and dignity. The unserved poor pay 10 or more times

what their fellow citizens served with formal supplies pay for a liter of water. In many parts of the world, women and children spend many hours a day fetching water. Combined with their other activities, this leaves little time for rest, increasing vulnerability to mental stress, chronic ill health, and disease. It also reduces opportunities to build strong social support systems. And it makes it difficult to gain access to information and public support services, such as agricultural extension. Moreover, it forces people to opt for appalling alternatives, such as knowingly taking water from an unsafe but nearer water supply rather than walking farther to clean water.

Lack of excreta management poses a fundamental threat to global water resources. The pollution of rivers and shorelines hurts tourism and agriculture, often vital to a country's economy.

Halving the proportion of population without access to safe drinking water and sanitation will contribute much to the achievement of many other Millennium Development Goals. Fewer children will die from water-borne diseases such as diarrhea. More women will have more time to engage in productive activities, reducing income poverty and enlarging their economic and social opportunities. And girls will have fewer barriers to face in attending school.

Slums

Target: Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers

The Cities without Slums initiative was endorsed at the Millennium Summit, with its goal of improving the lives of 100 million slum dwellers included in the Millennium Declaration. This initiative will focus on upgrading unhealthy and often threatening urban slums and squatter settlements. Its aim is to improve basic municipal services for 100 million people over the next 20 years.

Improving slum dwellers' lives includes better housing; more secure tenure; greater access to water, sanitation, and waste management services and cleaner fuels; reduced urban air pollution; and easier access to safe transport services. Achieving this goal will require powerful leadership, resolute political commitments, and ownership at the local level, coupled with broad-based partnerships at the global level. It will also require substantial financial resources.

The number of people living in urban slums increased from 712 million in 1993 to 837 million in 2001. Developing countries have an estimated 38 percent of urban residents living in slums. As the urban population increases, the number of people living in slums will likely rise, increasing the challenges in providing services.

Integrating the environment in the millennium package

The environment is central to the Millennium Development Goals, both in the specifics of *Goal 7: Ensure Environmental Sustainability* and in the linkages of the environment with the other goals. Interpreting the Environment Goal is problematic: its first target “to integrate the principles of sustainable development into country programs and reverse the loss of environmental resources” lacks a specific outcome and target date. Nevertheless, this booklet presents a practical framework for analyzing Goal 7, as well as its synergies with the rest of the millennium package.

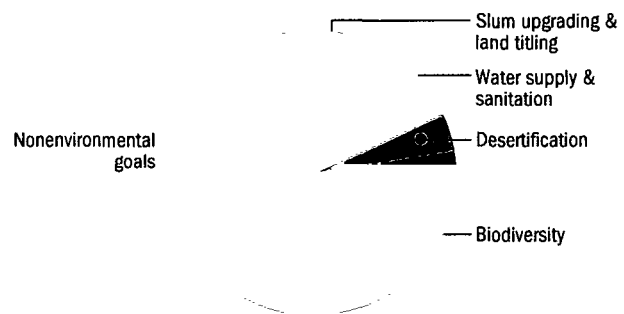
What are the costs of ensuring environmental sustainability—and how much additional aid is needed?

Ensuring environmental sustainability will demand a wide range of measures that will have costs. Some measures will imply financial expenditures—such as the cost of building sanitation infrastructure. The cost of other measures, however, will be in the form of forgoing opportunities. For instance, in abstaining from using ozone-depleting substances, countries will incur costlier production processes. Another example is biodiversity protection. In addition to the financial cost of establishing protected areas is the opportunity cost of agricultural income forgone.

Ensuring sustainability requires significant resources, both in absolute terms and in comparison with the whole millennium package. The World Bank’s Environment Department calculates that achieving Goal 7 may imply up to \$25 billion in additional aid beyond the estimated cost of \$40 to \$60 billion a year for achieving the other Millennium Development Goals.¹ This figure depends on some key assumptions, particularly regarding the financing of biodiversity hotspot protection, and on how the financial burden of ensuring sustainability is distributed.

A significant share of additional aid to developing countries needs to be directed to environmental issues if sustainability is to be ensured.

Additional aid needed to meet the MDGs: \$65–85 billion



Source: World Bank staff estimates.

But it is deemed conservative, because water stress, clean air, and coastal-marine issues were not included in the analysis.

Ensuring sustainability will bring large pay-offs. For example, United Nations Environment Programme estimates suggest that agricultural productivity gains from stopping land degradation in drylands would amount to some \$50 billion a year. Environment Canada estimates suggest that the benefits of protecting the ozone layer would amount to \$17 billion a year, not even counting the health impacts.

A partnership for sustainable development

Goal 8: Develop a Global Partnership for Development focuses on the means of achieving the first seven goals. In the spirit of this goal, industrial and developing countries need to work in partnership to address sustainability issues. In the calculations here, industrial countries were expected to bear costs in two ways.

The first is by reducing the emissions of climate-change-inducing gases and ozone-depleting substances. The second is by providing aid to developing countries to finance interventions in biodiversity, land degradation, sanitation, and slum upgrading. Developing countries are assumed to take on a large fraction of total costs by cofinancing actions to combat desertification, bearing the opportunity cost of land in protected areas, abstaining from using ozone-depleting substances, and financing the infrastructure for water supply.

Since the Environment Goal can be interpreted widely or narrowly, the framework for analyzing Goal 7 presented in this booklet can be considered as a menu. If industrial countries wish to assist in the financing of these issues, they have their choices—from reducing carbon emissions to protecting biodiversity hotspots.

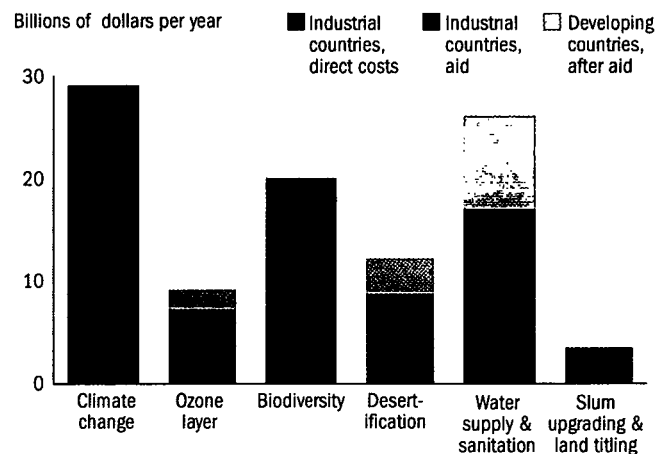
The recent Monterrey Summit witnessed renewed aid commitments by industrial countries. Can developing countries afford their share? The joint United Nations Environment Programme, World Bank, International Monetary Fund publication “Financing for Sustainable Development” illustrates how developing countries can generate public resources and attract private resources to finance these challenges.

More than money

The lessons of development experience, embraced by the Monterrey consensus, also apply to environmental issues. To ensure progress toward sustainability, the policy context is as important as the availability of funds. For example, perverse subsidies persist in a variety of sectors—energy, water, forestry, fisheries, agriculture. By contrast, market-friendly policies, such as carbon trading under the Kyoto Protocol, can vastly reduce the cost of implementing sustainability measures.

Developing and industrial countries will have to share the cost of ensuring environmental sustainability.

Costing and financing the environment goal: a partnership approach



Source: World Bank staff estimates.

A good investment

This booklet has briefly described many of the benefits of achieving the Environment Goal. Preserving the quantity and quality of natural resources and ensuring access to environmental services are key tools in addressing the Millennium Development Goals challenge, as they contribute to supporting sustainable livelihoods, fighting preventable diseases, and reducing vulnerability to natural hazards. If environmental sustainability is not ensured, achievements toward the remainder of the goals may be short-lived. Indeed, environmental actions may be among the most cost effective ways of achieving many of the other goals.

1. S. Devarajan, M. J. Miller, and E. V. Swanson. 2002. “Goals for Development. History, Prospects, and Costs” Policy Research Working Paper 2819, World Bank, Office of the Vice President

Millennium Development Goals

Goals and targets from the Millennium Declaration

Indicators for monitoring progress

Goal 1 Eradicate extreme poverty and hunger

Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day

- Proportion of population below \$1 a day^a
- Poverty gap ratio (incidence times depth of poverty)
- Share of poorest quintile in national consumption

Halve, between 1990 and 2015, the proportion of people who suffer from hunger

- Prevalence of underweight in children (under five years of age)
- Proportion of population below minimum level of dietary energy consumption

Goal 2 Achieve universal primary education

Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

- Net enrollment ratio in primary education
- Proportion of pupils starting grade 1 who reach grade 5
- Literacy rate of 15- to 24-year-olds

Goal 3 Promote gender equality and empower women

Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015

- Ratios of girls to boys in primary, secondary, and tertiary education
- Ratio of literate females to males among 15- to 24-year-olds
- Share of women in wage employment in the nonagricultural sector
- Proportion of seats held by women in national parliament

Goal 4 Reduce child mortality

Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

- Under-five mortality rate
- Infant mortality rate
- Proportion of one-year-old children immunized against measles

Goal 5 Improve maternal health

Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

- Maternal mortality ratio
- Proportion of births attended by skilled health personnel

Goal 6 Combat HIV/AIDS, malaria, and other diseases

Have halted by 2015 and begun to reverse the spread of HIV/AIDS

- HIV prevalence among 15- to 24-year-old pregnant women
- Condom use rate of the contraceptive prevalence rate^b
- Number of children orphaned by HIV/AIDS^c

Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

- Prevalence and death rates associated with malaria
- Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures^d
- Prevalence and death rates associated with tuberculosis
- Proportion of tuberculosis cases detected and cured under directly observed treatment short course (DOTS)

Goal 7 Ensure environmental sustainability

Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

- Proportion of land area covered by forest
- Ratio of area protected to maintain biological diversity to surface area
- Energy use per unit of GDP
- Carbon dioxide emissions (per capita) and consumption of ozone-depleting chlorofluorocarbons
- Proportion of population using solid fuels

Halve, by 2015, the proportion of people without sustainable access to safe drinking water

- Proportion of population with sustainable access to an improved water source, urban and rural

Goals and targets from the Millennium Declaration**Indicators for monitoring progress****Goal 7 Continued**

Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers

- Proportion of population with access to improved sanitation
- Proportion of households with access to secure tenure

Goal 8 Develop a global partnership for development

Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction—both nationally and internationally)

Some of the indicators listed below will be monitored separately for the least developed countries, Africa, landlocked countries, and small island developing states.

Official development assistance (ODA)

- Net ODA, total and to least developed countries, as a percentage of DAC donors' gross national income
- Proportion of bilateral ODA for basic social services (basic education, primary health care, nutrition, safe water, and sanitation)
- Proportion of bilateral ODA that is untied
- ODA received by landlocked countries as a proportion of their GNI
- ODA received by small island developing states as a proportion of their GNI

Address the special needs of the least developed countries (includes tariff- and quota-free access for exports, enhanced program of debt relief for and cancellation of official bilateral debt, and more generous ODA for countries committed to poverty reduction)

Market access

- Proportion of total developed country imports (excluding arms) from developing countries and least developed countries admitted free of duties
- Average tariffs imposed by developed countries on agricultural products and textiles and clothing
- Agricultural support estimate for OECD countries as a percentage of their GDP
- Proportion of ODA provided to help build trade capacity^e

Address the special needs of landlocked countries and small island developing states (through the Program of Action for the Sustainable Development of Small Island Developing States and 22nd General Assembly provisions)

Debt sustainability

- Total number of countries that have reached their HIPC decision points and completion points (cumulative)
- Debt relief committed under HIPC initiative
- Debt service as a percentage of exports of goods and services

Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

In cooperation with developing countries, develop and implement strategies for decent and productive work for youth

- Unemployment rate of 15- to 24-year-olds, male and female and total^f

In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries

- Proportion of population with access to affordable, essential drugs on a sustainable basis

In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies

- Telephone lines and cellular subscribers per 100 people
- Personal computers in use per 100 people
- Internet users per 100 people

a. For monitoring at the country level, national poverty lines should be used.

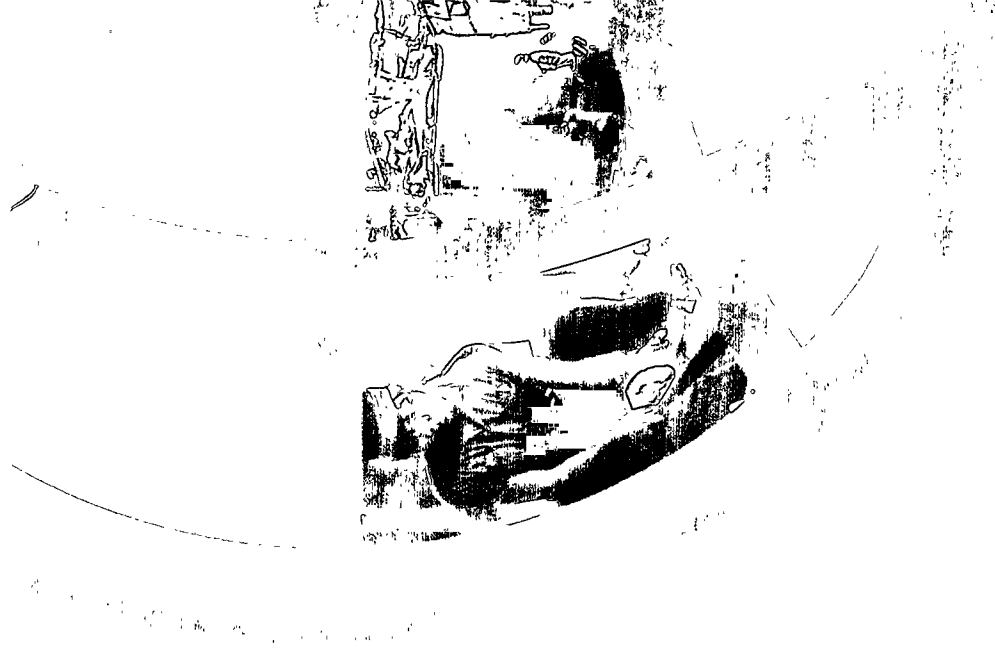
b. Among contraceptive methods, only condoms are effective in reducing the spread of HIV.

c. The proportion of orphan to nonorphan 10- to 14-year-olds who are attending school.

d. Percentage of children under five sleeping under insecticide-treated bed nets (prevention) and appropriately treated (treatment).

e. OECD and WTO are collecting data, which will be available from 2001 on.

f. An improved measure of the target is under development by ILO.



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