



## Progress towards the Millennium Development Goals, 1990-2005

### GOAL 7 – Ensure environmental sustainability

Reversing the loss of environmental resources, including forests, biological diversity and the earth's ozone layer, are among the targets for Millennium Development Goal 7, along with provision of safe water, adequate sanitation and decent, affordable housing for the world's poor.

[How the indicators are calculated](#)

#### Target 9 - Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources

##### Managing forest resources sustainably

Forests provide numerous functions that are vital for humankind. These include the provision of wood and non-wood products and services such as carbon sequestration, watershed protection, soil conservation and recreation.

Forest resources also play a role in poverty reduction and food security. Tens of millions of people, mainly in rural areas, depend on forests as a major source of subsistence and cash income, while hundreds of millions of people depend on forests to supplement their livelihoods. This presents both problems and opportunities. On one hand, poverty can lead to overutilization and degradation of forest resources. On the other hand, the very reliance of people on forest resources may encourage sustainable forest management that could contribute to improved livelihoods for many.

The extent and composition of forests varied greatly in prehistoric times, due to climatic and geologic fluctuations. In historic times, it is mainly human pressure from the cutting of the forest that has affected large wooded areas in all regions.

Forests have been converted to other land uses (especially for food production), degraded through unsustainable use, or altered through purposeful management. Currently, most losses of forest resources occur in tropical regions. While substantial areas of forest remain, there is now widespread recognition that the resource is not infinite and that its wise and sustainable use is needed for our survival.

##### Indicators to monitor target 9

This target is monitored by five indicators. Unlike many of the other MDG targets, these indicators are not focused on developing countries alone, but incorporate actions taken or required by rich countries as well to ensure environmental sustainability. The indicators track progress in five areas related to sustainable development and sustainable use of environmental resources: the sustainable management of forestry resources; the preservation of biodiversity and genetic resources; the efficient use of energy; the "greenhouse effect", which is linked to global warming; and damage to the ozone layer – tracked by the consumption of ozone-depleting substances.

The proportion of forested area in a country provides an indication of the relative importance of the forest; similarly, changes in forested areas reflect the unregulated demand for land and forest products. In the year 2000, total forest area amounted to 3.9 billion hectares, or about 30 per cent of the world's land area. About half of the forests are in the tropics and subtropics, and the other half in temperate and boreal ecological zones.

#### Indicator on forests

The indicator used to track the change in forest area is the proportion of land area covered by forest – defined as both natural forests and forest plantations, excluding stands of trees established primarily for agricultural production, such as fruit tree plantations.

The Food and Agriculture Organization of the UN (FAO) estimates that, from 1990 to 2000, the decrease in forest areas was 14.2 million hectares a year in tropical forest, and 0.4 million hectares a year in non-tropical areas. This decrease was partially offset in non-tropical areas by the expansion of planted forests. But non-tropical planted forests cannot make up for the loss of habitat and watershed purification in deforested tropical areas. The rapid loss of tropical forests remains a key concern, contributing to losses of biological diversity, increases of atmospheric carbon and desertification.

During the 1990s, the world lost 4.2 per cent of its natural forests but gained 1.8 per cent through natural expansion and the establishment of planted forests. This resulted in the net reduction of 2.4 per cent over the ten-year period. The estimated net loss during the decade was 94,000 square kilometres per year, an area about the size of Portugal, or 940,000 square kilometres over the entire decade – an area the size of Venezuela.

In the past, deforestation was often directly attributed to population growth and to small-scale and shifting patterns of cultivation. Over the last decade, the direct link of population growth to deforestation has become less clear. As the economies of most countries have grown, the relative importance of the agricultural sector has decreased. Instead, most countries have experienced large-scale migration to cities. Globally, only 18 per cent of the expected population growth between 2000 and 2005 will occur in rural areas, and the rural population is already decreasing in the developed regions.<sup>1</sup> Although population pressures have eased to some extent, forests – and especially tropical forests – are still under threat. Harvesting of timber makes land more accessible for deforestation, and large-scale capital-intensive agriculture is expanding rapidly in several regions.

**Table 1. Gross and net change in forest area, 1990-2000 (million hectares per year)**

Domain	Deforestation <sup>1/</sup>	Increase in forest area <sup>2/</sup>	Net change in forest area
Tropical	-14.2	+1.9	-12.3
Non-tropical	-0.4	+3.3	+2.9
Global	-14.6	+5.2	-9.4

*Source:* Food and Agriculture Organization of the United Nations (FAO), *Global forest resources assessment 2000* (Rome, 2000).

<sup>1/</sup> Deforestation indicates the conversion of forest to other land use or long-term reduction of the tree canopy cover below the minimum 10 per cent threshold.

<sup>2/</sup> Increase in forest area includes afforestation, that is, the establishment of forest plantations in non-forested areas, and natural expansion of forests into previously non-forested areas.

Deforestation has other social and economic implications. For example, the clearing of large areas of communal forest land for agriculture may reduce access to forest products that are required on a daily basis by poor and landless people. It may also increase the time women spend collecting firewood and other forest products – time that could otherwise be spent on more productive activities.

**Table 2. Forest area by region, 1990-2000**

	Percentage of land area covered by forest	
	1990	2000
World	30.3	29.6
Developed regions	25.7	25.9
CIS, Europe	48.9	49.2
CIS, Asia	5.1	5.8
Northern Africa	1.0	1.0
Sub-Saharan Africa	29.3	27.1
Latin America	50.4	48.0
Caribbean	24.4	25.0
Eastern Asia	15.4	17.0
Southern Asia	13.5	13.3
South-Eastern Asia	53.9	48.6
Western Asia	3.1	3.1
Oceania	68.0	65.7

Source: United Nations Statistics Division, "World and regional trends", Millennium Indicators Database, available from <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by the Food and Agriculture Organization of the United Nations (FAO).

### *Monitoring progress in sustainable forest management*

Most countries have adopted policies to promote the sustainable management of forests. Moreover, many of these countries are now committed to monitoring progress in this area – a major development since the early 1990s and the United Nations Conference on Environment and Development (UNCED). Many developed countries have experienced an increase in forest area as rural populations decline and countries increase their commitment to sustainable forest management.

However, the amount of forested area is only a general development indicator for forestry (see box on "Sustainable forest management"). The quality of forests – including their productivity, health, carbon storage and biodiversity – are often more significant factors when compared to the total extent of forests.

Furthermore, in a cross-sectoral perspective, it may not be obvious whether a change in forest area is a negative or positive development since it also implies a change in agricultural capacity. As a result, the total forest area as a single indicator does not fully reflect important trends relating to environmental, economic and social benefits from forest and land resources.

Recent developments in forestry include the rapid expansion of protected forest areas, the increased supply of wood from planted forests and trees outside forests, and the re-growth of secondary forests in vast areas where agriculture has temporarily been practised.

Drawing from the progress of inter-governmental processes related to forests and the global forest resources assessment process, additional indicators could include: area of primary forest, forest area

**Sustainable forest management** has been widely accepted as an approach that addresses environmental, economic and social benefits from forests. There is wide consensus on seven themes that describe the scope of sustainable forest management:

1. Extent of forest resources
2. Biological diversity
3. Forest health and vitality
4. Protective functions of forest resources
5. Productive functions of forest resources
6. Socio-economic functions
7. Legal, policy and institutional framework

This framework is adopted and used in national and international forest policy development and implementation.

designated for conservation of biological diversity, area of intensively managed forest, consumption of fuelwood, forest carbon content.

Although forests are often used to portray the state of land-based natural resources (following decades of very strong emphasis on deforestation as the major environmental issue related to forests), the reality is more complex. While tropical deforestation remains a major issue, the return of forests in many areas, and the increasing management of forests for environmental purposes are encouraging and call for a richer description of forest development.

## Preserving biodiversity through protected areas

Protected areas<sup>2</sup> are an important indicator of environmental sustainability because they help to maintain biodiversity through the provision of species habitat and the preservation of genetic resources. Protected areas are also widely recognized as places of high social and economic value because they can support local livelihoods, protect soil and watersheds from erosion, and support tourism, science and research.

Designation and management of protected areas is a relatively new priority in national and international development programmes, but is now widely recognized as a policy commitment that can yield large social and economic as well as ecological dividends.

### Indicator on protected areas

Progress to preserve biodiversity is measured by the proportion of protected area, defined as the surface areas of nationally protected areas (terrestrial and marine) as a percentage of total territorial area.

**Table 3. Proportion of area protected to maintain biological diversity, 1990-2004**

	Protected area ratio to total territorial area (terrestrial and sea)		
	1994	2000	2004
World	11.2	12.3	12.9
Developing Regions	11.0	11.8	12.6
Northern Africa	4.2	4.4	4.6
Sub-Saharan Africa	11.1	11.2	11.3
Latin America & the Caribbean	15.9	17.3	17.8
Eastern Asia	8.3	10.4	14.4
Southern Asia	5.2	5.6	5.9
South-eastern Asia	8.3	9.4	9.4
Western Asia <sup>1/</sup>	22.2	22.7	22.7
Oceania	2.4	2.5	2.5
Commonwealth of Independent States	7.5	7.7	7.7
Commonwealth of Independent States, Asia	3.6	3.9	3.9
Commonwealth of Independent States, Europe	8.3	8.6	8.6
Developed Regions	13.9	16.1	16.7

*Source:* United Nations Statistics Division, "World and regional trends", Millennium Indicators Database, available from <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by UNEP-WCMC.

The UN List of Protected Areas<sup>3</sup> is continuously updated since it was published and launched at the 5<sup>th</sup> World Parks Congress in Durban, South Africa in September 2003. So far it has recorded over 100,000 sites, covering 19.6 million square kilometres. This represents about 13.2 per cent of the Earth's land surface,<sup>4</sup> or 11.8 per cent of territorial area (land and sea). In contrast, only 1.64 million square kilometres of the world's marine environment, around 0.5 per cent of the world's sea area, is protected – reinforcing the importance of the World Summit on Sustainable Development's 2012 target for establishing an effective system for the protection of global marine areas.

Regional data indicate a significant increase in protected areas between 1990 and 2004 in almost all regions. The largest percentage increases were in Eastern Asia, in Latin America and the Caribbean and in South-Eastern Asia (the large coverage in Western Asia is mainly due to the existence of a

single protected area in Saudi Arabia). In contrast, there was only a small increase in the percentage of protected territory in Northern Africa and Oceania, and a decrease in protected territory in sub-Saharan Africa. The largest percentage of protected territory is in Latin America and the Caribbean (if Western Asia is excluded).

Although safeguarding biodiversity has been the primary motivation behind protecting land, there is a broadening of awareness about the value of protected areas. Donors, governments at all levels, indigenous groups, local communities, non-governmental organizations and the private sector have invested – and are investing – in protected areas as places vital to ensuring a sustainable future for humanity.

There are different categories of protected areas, as set out by the International Union for the Conservation of Nature (IUCN).<sup>5</sup> National parks (category II) have the highest overall coverage at the global level, but there is a marked increase in managed resource areas (category VI sites). Strict nature reserves and wilderness areas (categories Ia and Ib, respectively) are generally few in number and of average size. Category III sites – natural monuments – are numerous, but make up only 1 per cent of the total coverage of protected areas. The increase in categories more open to human use reflects the need to integrate the aspirations of human populations with the long-term need to conserve biodiversity.

The scope and extent of actions needed to safeguard biodiversity are still only estimates at best, and the protected areas concept may need to be expanded to cover biodiversity “hotspots” and “mega-diverse” areas, where biodiversity is relatively untouched. In 2002, the Plan of Implementation agreed to at the World Summit on Sustainable Development set the goal of reducing biodiversity loss significantly by the year 2010. In the same year, the 6<sup>th</sup> Conference of the Parties of the Convention on Biological Diversity adopted a Global Strategy for Plant Conservation, setting a global target to “conserve effectively at least 10 per cent of each of the world’s ecological regions by 2010”. In reality, we may still be a long way from achieving an adequate global network of protected areas to conserve biological diversity.

## Using energy efficiently

Environmental sustainability calls for sustainable use of resources. Energy is one of the most important contributors to any economy, both through direct consumption by households and as an important input to other economic production. Energy production and use have a considerable impact on the environment, which differ greatly depending on the energy source. Fuel combustion is the main source of local and regional air pollution and greenhouse gas emissions. Other negative effects involve reduction in water quality, changes in land use, risks related to the nuclear fuel cycle and to the extraction, transport and use of fossil fuels. The structure of a country’s energy supply and the efficiency of its use are key determinants of environmental performance and the sustainability of economic development.

### Indicator of energy intensity

The ratio of energy use per unit of gross domestic product measured in terms of purchasing power parity (PPP) is an indicator of the energy intensity of an economy and energy efficiency.

Many countries in both developed and developing regions have made progress in using commercial energy more efficiently, therefore reducing their energy intensity from 1990 to 2002. During this period, developed regions have reduced energy use from 218 to 193 kilograms of oil equivalent per \$1,000 of gross domestic product (GDP) in 2000 PPP. Eastern Asian countries have made the largest decrease, from 424 to 221 kilograms of oil equivalent. In contrast, Western Asia, South-Eastern Asia, Northern Africa and sub-Saharan Africa have increased energy use per unit of GDP over the same period.

Despite improvements in energy efficiency in some developing regions, the gap between developed and developing economies persists mainly due to the lack of access to affordable modern energy services in poorer countries. In 1990, developing regions, on average, were using 269 kilograms of oil equivalent to produce \$1,000 worth of PPP GDP, compared with 218 kilograms in developed regions – 23 per cent more. By 2002, developing regions were using 217 kilograms of oil equivalent, compared to 193 kilograms in the developed world – or 12 per cent more.

**Table 4. Energy use per unit of GDP, 1990 and 2002**

	Consumption of kg oil equivalent per \$1,000 GDP (PPP)	
	1990	2002
World	259	216
Developing Regions	269	217
Northern Africa	167	173
Sub-Saharan Africa	356	361
Latin America and Caribbean	169	164
Eastern Asia	424	221
Southern Asia	245	209
South-eastern Asia	202	214
Western Asia	258	292
Commonwealth of Independent States	566	554
Commonwealth of Independent States, Asia	725	657
Commonwealth of Independent States, Europe	552	539
Transition countries in south-eastern Europe	415	269
Developed Regions	218	193

*Source:* United Nations Statistics Division, "World and regional trends", Millennium Indicators Database, available from <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by IEA, World Bank.

## Reducing exposure to indoor air pollution

Approximately half the world's population rely on biomass (wood, charcoal, crop residues, and dung) and coal as their primary source of energy for cooking and heating. While virtually no households in the countries of the established market economies use solid fuel as the primary source of domestic energy, the fraction is well above 50 per cent in Africa and South-Eastern Asia. Solid fuel use is especially common among poor households.

### Indicator to monitor exposure to indoor air pollution

Progress in reducing exposure to indoor air pollution is monitored by the proportion of population relying on biomass (wood, charcoal, crop residues, and dung) and coal as their primary source of domestic energy for cooking and heating.

Solid fuel use can have a significant impact on local as well as global environments. Reliance on wood can put considerable pressure on forests, and deforestation is a driving force for land degradation and desertification. Open fires and traditional stoves typically have low efficiency and, consequently, a large percentage of the fuel energy is lost as products of incomplete combustion.

Incomplete and inefficient combustion of solid fuels results in the emission of hundreds of compounds, many of which are health-damaging pollutants or greenhouse gases that contribute to global climate change. One of these gases is methane, which has a greenhouse effect many times greater than carbon dioxide (CO<sub>2</sub>).

Linkages among household solid fuel use, indoor air pollution, deforestation and soil erosion, and greenhouse gas emissions have become increasingly important in understanding the impact of domestic energy use on the local and global environment, and on health. Exposure to indoor air pollution from the combustion of solid fuels, which especially affects women and small children, has been implicated, with varying degrees of evidence, as a causal agent in several diseases common to developing countries.

Exposure to indoor air pollution is responsible for more than 900,000 deaths due to pneumonia in children under five and nearly 700,000 deaths due to chronic respiratory diseases and lung cancer (in relation to coal use) in adults, with women suffering disproportionately. This neglected health risk is also associated with diseases such as perinatal conditions and low birthweight, tuberculosis, asthma, nasopharyngeal and laryngeal cancer, and cataracts. In poor developing countries, indoor air pollution is responsible for 3.7 per cent of the total disease burden, making it the most lethal killer after



malnutrition, unsafe sex and lack of safe water and adequate sanitation. Reducing exposure to indoor air pollution will thus make a significant contribution to reducing child morbidity and mortality, and to improving women's health. The World Health Organization estimates that in 2000, approximately 1.6 million deaths, almost all in developing countries and among children and women, were attributable to indoor air pollution from solid fuels.

Typical 24-hour average concentrations of particulate matter (PM<sub>10</sub>) pollution in homes using biofuels may range as high as 5,000 micrograms per cubic metre or more throughout the year. This is more than 33 times higher than the latest standard set by the US Environmental Protection Agency of less than 150 micrograms per cubic metre (annual average below 50 micrograms per cubic metre).

Poor households often do not have the resources to obtain cleaner, more efficient fuels. Conversely, reliance on simple fuels and appliances limits opportunities for economic development, continuing a vicious cycle of energy poverty, human underdevelopment and ill health. The International Energy Agency predicts that the target of halving the proportion of the world's people living on less than \$1 a day by 2015 can only be achieved if governments act decisively to accelerate the transition to modern fuels and, more specifically, reduce the number of people relying almost entirely on traditional biomass to less than 1.85 billion by 2015. If current trends continue, the International Energy Agency estimates that 2.55 billion people will rely almost entirely on biofuels by 2015.

	1996/2003
World	54
Northern Africa	<5
Sub-Saharan Africa	80
Latin America and the Caribbean	16
Eastern Asia	75
Southern Asia	72
South-Eastern Asia	67
Western Asia	12
Oceania	73
Commonwealth of Independent States, Europe	9
Commonwealth of Independent States, Asia	47
Developed regions	<5

*Source:* United Nations Statistics Division, based on country data provided by WHO. See Millennium Indicators Database, "World and regional trends", <http://millenniumindicators.un.org>, (accessed June 2005).

#### *The gender dimension of indoor air pollution*

There is some evidence that, in certain countries, the trend towards reduced household dependence on biomass fuels slowed in the 1990s, or even reversed, especially among poorer households. That said, low-cost technologies have begun to be tested in a number of settings to reduce the use of household solid fuel. Women are particularly affected by the pattern of fuel use for several reasons. First, in developing countries, women are important users and producers of energy resources for household and subsistence purposes. Moreover, many of women's activities in the informal sector are fuel-intensive (such as small-scale enterprises dealing with brewing beer, par-boiling rice, baking, smoking fish, processing palm oil, etc), with implications for their health and incomes, depending on the availability and price of fuels. Finally, use of different kinds of fuels can have a different impact on women and men. Collecting fuels such as dung, crop residues and wood is very labour-intensive and would be not required if kerosene, gas and electricity were used by the household.

In addition, in many parts of the world, deforestation has meant that wood – the most widely used solid fuel – is located farther and farther away from the places where people live. In such cases, someone must go and collect this distant wood every few days, if not daily. Often, this task falls to female members of a household, who may spend several hours a day collecting wood.

Making alternative fuel sources (and the means to use them safely) available can have a particularly positive effect on the health of women, both by reducing their exposure to damaging fumes and by reducing the burden on them of a particularly taxing and time-consuming labour. Alternative fuel sources may also open up opportunities for education and income-generation. This can help break a vicious cycle, where solid fuel use restricts economic development and poverty diminishes the ability to switch to cleaner fuels.

## Curbing greenhouse gas emissions

Most of the climate warming that has occurred over the last 50 years is likely due to a significant increase in greenhouse gas emissions.<sup>6</sup> The global average surface temperature increased 0.6 degrees Celsius during the 20<sup>th</sup> century, and during the most recent period of warming, the largest increases in temperature, beyond regional variability in the climate system, occurred over the middle and high latitudes of the continents in the Northern Hemisphere. There, global ocean heat content rose significantly and annual land precipitation also continued to increase.

### Indicator of greenhouse gas emissions

The greenhouse effect is monitored by tracking the amount of CO<sub>2</sub> emissions—largely a by-product of energy production and use. CO<sub>2</sub> emissions account for the largest share of greenhouse gases that are associated with global warming.

1/ Total CO<sub>2</sub> emissions from fossil fuels (expressed in million metric tons of CO<sub>2</sub>) includes CO<sub>2</sub> emissions from: solid fuel consumption, liquid fuel consumption, gas fuel consumption; cement production; and gas.

**Table 6. CO<sub>2</sub> emissions**

	Millions of metric tons of CO <sub>2</sub>		Per capita emissions (metric tons per person)	
	1990	2002	1990	2002
<i>Fossil fuel sources<sup>1/</sup></i>				
World <sup>2/</sup>	21,346	24,348	4.05	3.91
Developed regions <sup>3, 4, 5/</sup>	11,522	12,236	12.62	12.58
Developing regions <sup>6/</sup>	6,817	10,239	1.68	2.07
CIS <sup>7/</sup>	3,196	2,163	11.28	7.73

*Source:* United Nations Statistics Division, based on country data provided by the United States Carbon Dioxide Information Analysis Center (CDIAC) and the United Nations Framework Convention on Climate Change (UNFCCC). See Millennium Indicators Database, “World and regional trends”, <http://millenniumindicators.un.org>, (accessed June 2005).

2/ Based on data provided by the United States Carbon Dioxide Information Analysis Center (CDIAC).

3/ Based on the annual national emission inventories of annex I countries (with the exception of Belarus, Russian Federation and Ukraine, which are included in CIS) that report to the United Nations Framework Convention on Climate Change (UNFCCC); non-annex I countries do not have annual reporting obligations.

4/ In order to assess trends for Annex 1 countries as a group, the aggregate figures for 2002 include data referring to a previous year for countries where 2002 data were not available. Data refer to 1999 for Liechtenstein, and to 2001 for Poland.

5/ Excluding emissions/sinks from land-use change and forestry.

6/ Based on data provided by CDIAC.

7/ Based on data provided by CDIAC. The 1990 columns show 1992 data for CIS countries.

Carbon dioxide, or CO<sub>2</sub>, is the main source of this warming trend, known as the “greenhouse effect”, whose repercussions could include rising sea waters, more frequent and intense storms, the extinction of species, worsening droughts and crop failures. Concern over global warming led to the Kyoto Protocol in 1997, which called for reductions in carbon dioxide emissions. Though heralded by its proponents as a landmark agreement to mitigate climate change, the protocol was criticized by its detractors as being inequitable and costly to implement. The United States, the world’s largest producer of greenhouse gases, has rejected the protocol.



Carbon dioxide – mainly from the burning of fossil fuels, such as coal, oil and natural gas – accounts for 60 per cent of the total changes in concentrations of all long-lived and globally mixed greenhouse gases. Globally, human emissions, referred to as “anthropogenic emissions” of CO<sub>2</sub>, increased, although with some fluctuations, from 21,346 million metric tons of carbon dioxide in 1990 to 24,348 million metric tons of carbon dioxide in 2002. Because of population growth over the same period, there was a small decrease in the emissions per capita – from 4.05 to 3.91 metric tons. In the developing regions, the estimated emissions of CO<sub>2</sub> increased by 50 per cent between 1990 and 2002, from 6,817 to 10,239 million metric tons of carbon dioxide.

Data for the developed countries are available from the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC). Countries in the group of Annex I Parties to the convention are requested to submit information on national greenhouse gas inventories annually. In this group, there was an overall increase of 6 per cent in CO<sub>2</sub> emissions between 1990 and 2002. On the basis of projections reported in the national communications for Annex I Parties as a whole, CO<sub>2</sub> emissions are projected to grow by 8 per cent by 2010 if no additional measures are taken.<sup>7</sup> In the Commonwealth of Independent States, the overall decrease of 32 per cent of CO<sub>2</sub> emissions since 1992 is mainly due to economic restructuring during that period.

As for the other greenhouse gases, methane emissions account for 20 per cent, nitrous oxide emissions for 6 per cent and halocarbons (chlorofluorocarbons-CFCs, hydrofluorocarbons-HFCs, Perfluorocarbons-PFCs) and Sulfur hexafluoride (SF<sub>6</sub>) contribute to the remaining 14 per cent of the total changes in concentrations of all long-lived and globally mixed greenhouse gases.

**Chart 1. Countries and territories with carbon dioxide emissions greater than 15 metric tons of CO<sub>2</sub> per capita**

Carbon dioxide emissions, per capita, 2002	
United States Virgin Islands	91.9
Qatar	53.1
Trinidad and Tobago	31.9
Bahrain	30.6
Netherlands Antilles	27.9
Guam	25.5
United Arab Emirates	25.1
Kuwait	24.6
Luxembourg	21.1
Aruba	20.9
United States	20.1
Australia	18.3
Brunei Darussalam	17.7
Canada	16.5
Gibraltar	16.3
Montserrat	15.7

*Source:* United Nations Statistics Division, “World and regional trends”, Millennium Indicators Database, <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by Carbon Dioxide Information Analysis Center.

## Phasing out ozone-depleting substances

The ozone layer in the stratosphere absorbs ultraviolet radiation, which has been associated with rising levels of skin cancer and other harmful effects in living species. Concern over ozone-depleting substances, or ODSs, led over 180 countries to sign the Montreal Protocol in 1987.<sup>8</sup> Through this extraordinary act of global cooperation, countries committed themselves to dramatic reductions in the consumption of ozone-depleting substances (ODSs), such as chlorofluorocarbons (CFCs).<sup>9</sup> The goals of the Montreal Protocol have been largely achieved. By 1996, the consumption of CFCs in the developed countries was down to a “residual amount” and the impact on the ozone layer has been substantially reduced.

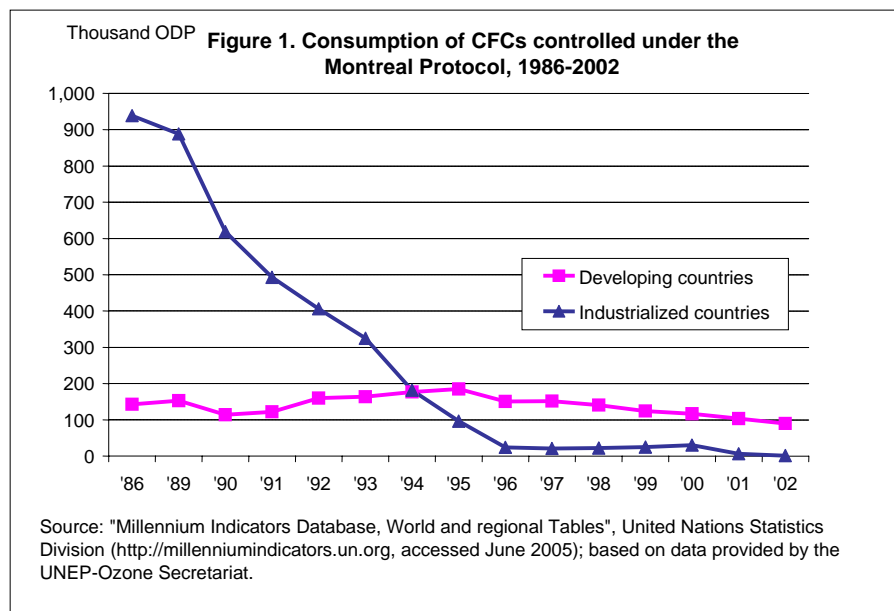
### Indicator on consumption of ozone-depleting substances

The phasing out of ozone-depleting substances, and their substitution by less harmful substances or new processes, are aimed at the recovery of the ozone layer. Progress in the reduction of global consumption of these substances is monitored on the basis of the consumption of CFCs.

The stratospheric ozone layer is gradually recovering as natural processes slowly remove ODSs from the atmosphere.<sup>10</sup> The ozone “hole” over the Antarctic, which nearly tripled in size from the mid-1980s to 2000 – from about 10 million square kilometres to a record 28 million square kilometers – is projected to decrease.<sup>11</sup> However, restoration to pre-ozone-hole values is not expected for another 50 years or so, due to the deleterious effects of ODSs that were emitted into the atmosphere in the past. The total abundance of chlorine and bromine in the lower atmosphere was observed to have peaked in 1994 and continues to decline. In the stratosphere, the total abundance of chlorine is at, or near, its peak.

To date, there are 187 Parties to the ozone treaties – the Vienna Convention and the Montreal Protocol – of which over 170 have reported data for various years. Industrialized countries have, in general, complied with the protocol's requirement of reducing their consumption of ozone depleting substances. Under article 5 of the protocol, developing countries were given a grace period of about ten years. The control measures now in effect for developing countries called for a freeze in CFC consumption at base level by 1 July 1999, and halon and methyl bromide consumption at base level by 1 January 2002. Further reduction measures included a 50 per cent reduction of CFC and halon use by 1 January 2005, and a 20 per cent reduction in methyl bromide use by that same date. The base level for CFCs for developing countries is defined as the average consumption for the years 1995-1997. The consumption of CFCs in developing countries began to decrease after 1995 – down from 185,290 ODP tons in 1995 to 103,372 ODP tons in 2001 and 89,585 ODP tons in 2002.<sup>12</sup>

The global consumption of CFCs controlled under the Montreal Protocol<sup>13</sup> dropped from 1.1 million tons of ozone depleting potential (ODP tons) in 1986, before the adoption of the Montreal Protocol, to only about 91,000 ODP tons in 2002.<sup>14</sup> The bulk of the 1986 consumption – more than 0.9 million ODP tons – was consumed in industrialized countries, but by 1996 these countries consumed only a residual amount (24,260 ODP tons), in compliance with the Protocol.



The quick and economical reduction in the consumption of CFCs was possible due to the development and commercialization of alternatives to ozone-depleting substances. Hydrochlorofluorocarbons (HCFCs) were developed as the first major replacement for CFCs. While much less destructive than CFCs, HCFCs also contribute to ozone depletion. HCFCs were critical for meeting the early CFC phase-out goals, but are generally considered an interim solution because they do have some ozone-depleting potential and ozone-safe alternatives are available for most applications. CFCs are also being replaced by hydrofluorocarbons (HFCs). The Kyoto Protocol on climate change includes HFCs in the basket of six gases whose emissions are to be reduced by the industrialized countries, since HFCs have a large global warming potential. Concentrations of HCFCs and HFCs in the atmosphere are increasing since they have been widely used as substitutes for the CFCs that are being phased out.<sup>15</sup>

## Target 10: Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation

Access to safe drinking water and basic sanitation is an indispensable component of primary health care and a precondition for success in the fight against poverty, hunger and child deaths and in achieving gender equality. It is also a basic human right. The United Nations Committee on Economic, Cultural and Social Rights has affirmed that “Water is fundamental for life and health. The human right to water is indispensable for leading a healthy life in human dignity. It is a prerequisite to the realization of all other human rights”.

### Indicator on access to water

Access to water is measured by the percentage of population who use “improved” sources of water\*, as scientific standards for determining “safe” water are not practical to apply in most developing regions.

\*Improved sources are defined in the section “How the indicators are calculated” at the end of the chapter.

## Expanding use of improved drinking water sources

In 2002, 83 per cent of the world’s population used improved drinking water sources, up from an estimated 77 per cent in 1990. This put the world on track to achieve the MDG target of halving, by 2015, the proportion of people without sustainable access to safe drinking water. Over the period 1990 to 2002, 1.1 billion people gained access to safe drinking water.

The region with the greatest progress was Southern Asia, with most of the increase attributable to India, where coverage increased from 68 to 86 per cent over the decade. Progress was significant also in sub-Saharan Africa. However, coverage there remains however very low: only 58 per cent of the population has access to improved water sources. In Eastern Asia, coverage increased in rural areas, but decreased in urban areas. This contrasting trend in the region reflects what happened in China over the decade, with coverage in urban areas decreasing from 100 to 92 per cent. The lowest coverage is in Oceania, with only 52 per cent of the population using improved drinking water sources. In contrast, other developing regions have achieved or are close to achieving 90 per cent coverage, including Northern Africa, Latin America and the Caribbean, and Western Asia.

Chart 2. Countries where less than 50 per cent of the population have access to an improved water source, 2002

Afghanistan	13
Ethiopia	22
Somalia	29
Cambodia	34
Chad	34
Papua New Guinea	39
Mozambique	42
Lao People’s Democratic Republic	43
Equatorial Guinea	44
Madagascar	45
Congo	46
Congo, Democratic Republic of the	46
Niger	46
Mali	48

Source: United Nations Statistics Division, “World and regional trends”, Millennium Indicators Database, <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by United Nations Children’s Fund and the World Health Organization.

In spite of progress in all regions, there are still 1.1 billion people in the world using potentially unsafe water supplies. Of the 1.1 billion of people without access to safe water, nearly two thirds live in Asia, with almost 300 million in China alone.

Most – or all – of the improvement in global coverage has occurred in rural areas. However, use of improved sources of water in rural areas remains very low in Oceania and sub-Saharan Africa. Moreover, the gap between urban dwellers and rural populations is large in all regions. Population growth has had a significant impact on the ability of countries to improve the coverage of drinking water. Globally, achieving the target on improved water supply means that, by 2015, the percentage of the world’s population *not* using improved water sources will have to decrease to 11.5 per cent. Because of population growth, this means that 6.4 billion people will need to be covered, up from the current 5.2 billion. Access will need to be provided to an additional 1.2 billion people – The equivalent of establishing new water supply services for about 300,000 people each day until 2015.

**Table 7. Population with sustainable access to an improved water source**

	Percentage of population					
	1990			2002		
	Total	Urban	Rural	Total	Urban	Rural
World	77	95	63	83	95	72
Commonwealth of Independent States	92	97	83	93	99	82
Northern Africa	88	95	82	90	96	84
Sub-Saharan Africa	49	82	36	58	82	45
Latin America and the Caribbean	83	93	58	89	95	69
Eastern Asia	72	99	60	78	93	68
Southern Asia	71	90	64	84	94	80
South-Eastern Asia	73	91	65	79	91	70
Western Asia	83	94	65	88	95	74
Oceania	51	92	39	52	91	40

Source: United Nations Statistics Division, based on country data provided by UNICEF and WHO. See *Millennium Indicators Database*, "World and regional trends", <http://millenniumindicators.un.org>, (accessed June 2005).

Ensuring that the world's water supplies provide safe drinking water free of chemical and bacterial contamination will be an additional challenge, requiring growth in investment and improved strategies to reach those who are not served by safe water sources, especially for regions of sub-Saharan Africa with low coverage.

### Expanding use of improved sanitation

In 2002, 58 per cent of the world's population were using toilets and other forms of improved sanitation. This means 2.6 billion people were without adequate sanitation facilities, increasing their risk of contracting diseases and diminishing their opportunities for education and productive work.

#### Indicator on access to sanitation

Access to adequate sanitation is measured by the percentage of population using improved sanitation facilities\* that are not publicly shared.

\*Improved facilities are defined in the section "How the indicators are calculated", at the end of this section.

Though estimates indicate that some progress was made in most of the developing regions between 1990 and 2002, sanitation coverage remains low. In Southern Asia, for instance, in spite of an 85 per cent increase over that period, almost two thirds of the population still lack access to improved sanitation.

**Table 8. Population with access to improved sanitation**

	Percentage of population					
	1990			2002		
	Total	Urban	Rural	Total	Urban	Rural
World	49	79	25	58	81	37
Commonwealth of Independent States	84	93	68	83	92	65
Northern Africa	65	84	47	73	89	57
Sub-Saharan Africa	32	54	24	36	55	26
Latin America and the Caribbean	69	82	35	75	84	44
Eastern Asia	24	64	7	45	69	30
Southern Asia	20	54	7	37	66	24
South-Eastern Asia	48	67	39	61	79	49
Western Asia	79	96	52	79	95	49
Oceania	58	83	50	55	84	46

Source: United Nations Statistics Division, based on country data provided by UNICEF and WHO. See *Millennium Indicators Database*, "World and regional trends", <http://millenniumindicators.un.org>, (accessed June 2005).

In parts of the developing world, the situation has actually deteriorated. Coverage decreased both in rural and urban areas in Western Asia, and in rural areas of Oceania and the Commonwealth of Independent States.

Most people without access to sanitation are those hard to reach: people living in remote rural areas or in overcrowded slums, and families displaced by conflict and famine. Of the 2.6 billion people using inadequate sanitation facilities, over 2 billion are in rural areas.

Access to improved sanitation in rural areas is often less than half that of urban areas. The gap is particularly wide in Eastern and Southern Asia, and in sub-Saharan Africa.

Over the period 1990 to 2002, about 1 billion people globally gained access to improved sanitation. Halving the proportion of the world's population without improved sanitation by 2015 (to 25.5 per cent) will require reaching an additional 1 billion urban dwellers and almost 900 million people in often remote rural communities.

### Meeting the water and sanitation target

From a global perspective, the world is on track to meet the water target. But sub-Saharan Africa, despite impressive progress, still lags behind. Obstacles to achieving the target in the region include conflict and political instability, high population growth rates and low priority given by to water and sanitation.<sup>16</sup>

If the 1990-2002 trend holds, the world will miss the sanitation target by more than half a billion people. The situation is most serious in sub-Saharan Africa and Southern Asia. The world will meet the sanitation target only through rapid acceleration in the provision of services.

Country data indicate how far some areas are from achieving the sanitation target. But they also reveal that a number of low-income countries have made tremendous gains in expanding services, even in the face of rapid population growth and economic stagnation. The lesson that can be drawn from these countries is that rapid progress is indeed possible, and that the goals, while ambitious, are within our grasp. Meeting the target will mean better health and improved education and employment opportunities, and improved chances for meeting the other MDG targets.

**Chart 3. Countries where less than 30 per cent of the population have access to improved sanitation, 2002**

Ethiopia	6
Afghanistan	8
Chad	8
Congo	9
Eritrea	9
Burkina Faso	12
Niger	12
Guinea	13
Cambodia	16
Comoros	23
Lao People's Democratic Republic	24
Sao Tome and Principe	24
Somalia	25
Liberia	26
Central African Republic	27
Mozambique	27
Nepal	27
Micronesia (Federated States of)	28
Congo, Democratic Republic of the	29

*Source:* United Nations Statistics Division, "World and regional trends", Millennium Indicators Database, <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by United Nations Children's Fund and World Health Organization.

## Target 11 - By 2020 to have achieved a significant improvement in the lives of at least 100 million slum dwellers

### The inhumanity of slums

Slum settlements take many forms, ranging from pavement dwellers in Mumbai to poor urban householders packed into dilapidated, unheated buildings of Moscow and Bucharest. There is one common thread among them all. Slums are the stage to the most acute scenarios of urban poverty, and physical and environmental deprivation.

Slum dwellers lack one or more of the following: adequate water, sanitation, durable housing, adequate living space indoors and security of tenure. In an urban setting, the lack of adequate water and sanitation often results from overcrowding, rather than having to travel long distances. Public toilets shared by up to 250 households, as in Nairobi slums, no doubt pose a health hazard. The less obvious, though equally severe consequence, is the toll such conditions take on women. In slum settlements, it can be a grave loss of dignity for women to use the outdoors as a toilet. Worse, they risk being raped if they use the outdoors or public toilets at night.

Disease, mortality and unemployment rates are much higher in slums than in other areas of cities and towns. The mortality and morbidity rates of children under five in slum areas often equal or exceed those found in rural areas.<sup>17,18</sup>

Closely linked to this deprivation in services and infrastructure is insecurity of housing and land tenure. Slum dwellers are often perceived as semi-criminal squatters on public or private urban land. Not only are they excluded from services, but from political decision-making processes. Investments in infrastructure, provision of planned urban land and low-cost housing and credit opportunities are often non-existent, or at best, insufficient, in slum areas. The more dramatic manifestation of the exclusion of slum dwellers by the authorities is evictions. In 2001 and 2002 alone, 6.7 and 6.3 million people, respectively, were subject to eviction and to threats of eviction.

### Tracking global trends on slums

The United Nations Human Settlements Programme (UN-HABITAT) estimates that there were 924 million slum dwellers worldwide in 2001.<sup>19</sup> More than 200 million new slum dwellers were added to the world's cities in the decade between 1990 and 2001 – a 28 per cent increase over that period. Although the share of slum dwellers among all urban residents has remained the same (close to one third), the magnitude of the problem has grown. If demographic projections hold true and there are no significant interventions to improve access to water, sanitation, security of tenure and adequate housing, the number of slum dwellers will grow to 1.4 billion people by 2020, with the vast majority in developing countries. This number far exceeds the target set – improving the lives of 100 million slum dwellers.

#### Indicators on slums

Measuring the existence of slums and improvement in slum conditions is carried out by referencing the level of access that slum dwellers have to improved services and security of tenure as well as their living conditions, including overcrowding, and the durability of their housing. Together these five indicators are used to estimate the total number of slum dwellers.



Despite the growth of slum populations between 1990 and 2001 in the developing regions, the overall proportion of slum dwellers within cities declined from 47 per cent to 43 per cent. The greatest reductions were in Northern Africa and South-Eastern Asia; in other developing regions, the share of slum dwellers either remained the same or fluctuated within a negligible margin. The largest percentage of slum dwellers is in sub-Saharan Africa, where almost three quarters of the urban population lives in slums. Southern Asia hosts the largest population of slum dwellers – over 250 million in 2001.

**Table 9. Slum dwellers, 1990 – 2001**

	Slum dwellers (millions)		Slum dwellers as percentage of urban population	
	1990	2001	1990	2001
World	721.6	924.0	31.6	31.6
Developed regions	41.8	45.2	6.0	6.0
CIS, Europe	9.2	8.9	6.0	6.0
CIS, Asia	9.7	9.8	30.3	29.4
Developing regions	660.9	860.1	47.0	43.3
Northern Africa	21.7	21.4	37.7	28.2
Sub-Saharan Africa	101.0	166.2	72.3	71.9
Latin America and the Caribbean	110.8	127.6	35.4	31.9
Eastern Asia	150.8	193.8	41.1	36.4
Eastern Asia excluding China	12.8	15.6	25.3	25.4
Southern Asia	198.7	253.1	63.7	59.0
South-Eastern Asia	49.0	56.8	36.8	28.0
Western Asia	28.6	40.8	34.4	35.3
Oceania	0.4	0.5	24.5	24.1

Source: United Nations Statistics Division, "World and regional trends", Millennium Indicators Database, <http://millenniumindicators.un.org> (accessed June 2005); based on data provided by UN-HABITAT.

Since the target on slum dwellers is defined in absolute numbers, the size of slum populations must also be considered. In sub-Saharan Africa, the proportion of the urban population living in slums, 72 per cent, has remained unchanged during the decade, while the size of the slum population grew by 66 per cent over the same period, reaching 166 million in 2001. In most sub-Saharan African countries, more than 80 per cent of the urban population live in slums. Some settlements in Chad, the Central African Republic and Ethiopia could be considered slum-cities. The slum population in the region increased by an average annual rate of 4.5 per cent and will double by 2005. In 2020, one out of four individuals living in slum areas will be living in sub-Saharan Africa.

Rapidly urbanizing countries like Mali, Mauritania, and Nigeria will continue to contribute to the growth of the slum population. Civil strife, unfavourable terms of trade for Africa's cash crops and industrial products will continue to draw poor peasants or refugees into cities. Despite the bleak picture overall, some countries of the region can be considered success stories. Policies to promote participatory slum upgrading were successful in Kenya, Uganda and Zimbabwe. In South Africa, the provision of low-cost housing on a massive scale, a policy of the post-Apartheid regime, helped reduce both the numbers of slum dwellers (by 170,000), as well as their share in the total urban population (from 46 per cent to 33 per cent).

Northern Africa is the only region where both the proportion and the absolute number of slum dwellers decreased. Slum upgrading in Egypt, Morocco and Tunisia have contributed to this progress.

The proportion of slum dwellers decreased in all subregions of Asia as a result of successful programmes. In the Republic of Korea, for instance, supplying mass low-cost housing to new urban settlers has yielded positive results. In China, the proportion of slum dwellers decreased from 44 per cent to 38 per cent. A policy emphasizing conscious urbanization, population control and high economic growth, accompanied by measures directed to the urban poor, contributed to this change. In Southern Asia, India contributed greatly to the overall positive trend in the region. India's programmes on housing savings in Mumbai, Kolkata and other cities have proven to be a success. This model is already being replicated by slum dwellers and local governments of other countries in Asia, including Cambodia and Nepal. However, even the most effective programmes in India are hard pressed to reach more than a small fraction of the burgeoning slum population, and while the percentage of slum dwellers decreased, their numbers grew from 131 million to 158 million. In South-Eastern Asia, Thailand experienced the most dramatic decline in the proportion of slums – reaching one tenth the level of a decade ago. This was due to a combination of factors associated with very high GDP growth rates as well as the commitment, starting with the King himself, to eliminate slums.

Because of its population size, Asia will continue to host the majority of world's slum dwellers for years to come, despite the effective strategies used to rehabilitate and upgrade slums.

Although Latin America and Caribbean is highly urbanized (the level of urbanization is similar to that of developed countries – slum populations are small.

The share of slum dwellers in the cities of Brazil declined from 45 per cent to 37 per cent, though the absolute number of people living in slums increased by 2 million. Exemplary participatory budgeting and slum upgrading programmes are being implemented in São Paulo as well as in other cities. Similar trends can be observed in Mexico. In Colombia, local and central authorities have taken big strides to prevent the formation of slums. In the capital city, Bogotá, a combination of effective urban development and management strategies, including a strong network of innovative public transportation and other infrastructure investments have eased the integration of slum dwellers into the city. The city has also been very effective in implementing forward-looking low-income housing plans, equipped with housing credit schemes and the creation of serviced land.

## What is improvement in the lives of slum dwellers?

The MDG target calls for improvement in the lives of 100 million slum dwellers. Given population growth and high rates of urbanization, irrespective of the measures taken to reverse the trends, the population of cities will increase, and a substantial portion of these citizens will live in slums. A crucial aspect of reversing these trends will be providing planned and serviced urban land, deterring the formation of new slums.

Moreover, it is important to define the scope of the improvement in the lives of slum dwellers. Improvement goes beyond slum upgrading and assumes a comprehensive approach, embracing poverty elimination and boosting public health and education services. Effective public health, primary education and employment-generating activities do improve the lives of slum dwellers, with or without the upgrading of the physical and spatial living conditions. What justifies a comprehensive approach is also the link between slum upgrading and the sustainability of programmes delivering health and education services. Many childhood diseases are caused by the lack of sanitation, or by unsafe water. The correlation between acute respiratory diseases and indoor pollution has also been documented. In terms of education, many studies indicate that a majority of parents settling in slums postpone sending their children, especially girls, to school, until they get their houses built or legally secure.

What further justifies the comprehensive approach to “improvement” is to encourage inclusive and egalitarian urban development strategies. The ultimate yardstick to measure improvement is defined as the reduction of urban inequities *vis à vis* poverty, health, employment and education. The main instruments used to measure progress in the reduction of such inequities are Urban Inequities Surveys, which compare the situation and progress among slum and non-slum dwellers, within the city setting. The number of surveys completed, however – 35 sample cities around the world – does not provide the critical mass to be of use in global monitoring.

In the absence of data, a short-term approach to defining and measuring “improvement of the lives of slum dwellers” will be limited to the criteria embraced in the current definition of slums (see section below, “How the indicators are calculated”). A slum household is considered “improved” if there is progress in one or more of the five attributes used to define a slum household.

The Millennium Declaration broke new ground by bringing slum dwellers into the world’s development agenda. Yet, the target of 100 million, one tenth of slum dwellers in 2000, is less than ideal for embracing the vast majority of existing, as well as potential, slum dwellers. The modesty of the target is not likely to stimulate scaling up of positive solutions. However, harmonizing target 11 with other MDG targets, that is, halving the proportion of slum dwellers by 2020, should provide a more favourable policy environment.

## Notes

<sup>1</sup> United Nations, *World Urbanization Prospects: The 2001 Revision* (United Nations publication, Sales No.E.02.XIII.16).

<sup>2</sup> The definition of a protected area adopted by the International Union for the Conservation of Nature is “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means”. Although all protected areas meet the general purposes contained in this definition, in practice the precise purposes for which protected areas are managed differ greatly.

<sup>3</sup> The UN List of Protected Areas provides a single definitive list of protected areas, classified according to a common system of management categories defined by the IUCN World Commission on Protected Areas.

<sup>4</sup> The regional figures for protected areas presented in this report are according to the year of establishment. In addition, areas for which the year of establishment is unknown—undated areas—have also been included.

<sup>5</sup> IUCN has defined a series of seven protected area management categories, based on primary management objective. They are the following: Ia. Strict Nature Reserve: protected area managed mainly for science; Ib. Wilderness Area: protected area managed mainly for wilderness protection; II. National Park: protected area managed mainly for ecosystem protection and recreation; III. Natural Monument: protected area managed mainly for conservation of specific natural features; IV. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention; V.

Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation; VI. Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

<sup>6</sup> The 1992 United Nations Framework Convention on Climate Change (UNFCCC), signed by 154 states (plus the European Commission) at Rio de Janeiro and now covering over 185 members, was established with the objective of “stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. Both developed and developing countries are required to submit national inventories of greenhouse gas emissions by source and greenhouse gas removals by sink (e.g., forests). Developed countries report these inventories annually using agreed methodologies to ensure that national data are consistent and comparable. Developing countries started making their initial submissions of national inventories in 1997 and data is not available for all countries or for all years.

<sup>7</sup> This information is based on projections provided in individual national communications (29 Annex I Parties reported projections for CO<sub>2</sub>) as compiled in the document “Compilation and synthesis of third national communications” (FCCC/SBI/2003/7/Add.3).

<sup>8</sup> See Status of ratification/accession/acceptance/approval of the agreements on the protection of the stratospheric ozone layer, document UNEP/OzL./Rat.80, 28 February 2004.

<sup>9</sup> The CFCs controlled by the Montreal Protocol include: CFC-11, 12, 13, 111, 112, 113, 114, 115, 211, 212, 213, 214, 215, 216 and 217.

<sup>10</sup> Report of the 2002 Assessment of the Science assessment report – Synthesis report, World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), Geneva, 2003.

<sup>11</sup> World Meteorological Organization, website: <http://www.wmo.ch/web/arep/ozone.html>.

<sup>12</sup> The figures for 2002 are based on data available from the Ozone Secretariat's ODS database.

<sup>13</sup> Consumption of CFCs is defined by the Montreal Protocol as: production plus imports minus exports, minus destroyed quantities minus feedstock uses.

<sup>14</sup> See the Ozone Secretariat's website at: <http://www.unep.org/ozone/> and information in: <http://www.unep.org/ozone/PressBack/Press-Backgrounder.shtml>.

<sup>15</sup> See the Ozone Secretariat's website at: <http://www.unep.org/ozone/> and information in: <http://www.unep.org/ozone/PressBack/Press-Backgrounder.shtml>.

<sup>16</sup> UNICEF and WHO, Meeting the MDG Drinking Water and Sanitation Target. A Mid-Term Assessment of Progress, 2004.

<sup>17</sup> African Population and Health Research Center, “Population and Health Dynamics in Nairobi's Informal Settlements”, p. 91 (Nairobi, April 2002).

<sup>18</sup> S. Fry, B. Cousins, and K. Olivola, “Health of Children Living in Urban Slums in Asia and the Near East: Review of Existing Literature and Data”, Environmental Health Project, Activity Report 109 (2002) (in Ahmedabad). “Infant mortality rates are twice as high in slums as the national rural average. Slum children under five suffer more and die more often from diarrhoea and acute respiratory infection than rural children. On average, slum children are more nutritionally wasted than all children in Gujarat State.” “Infant mortality rates in Manila's slums are triple those of non-slum areas.” p. xiii. “Nearly three quarters of all children under five in a Cairo squatter settlement suffered from an infectious disease during the preceding two weeks; one-quarter of these had had both diarrhea and acute respiratory infection.” p. xiv.

<sup>19</sup> Estimates are based on the operational definition of slums and secure tenure agreed by the UN-HABITAT Expert Group Meeting on Urban Indicators, Nairobi, 28-30 October 2002. See Recommendations of the Working Group on Slum Definitions, available from <http://www.unhabitat.org/programmes/quo/>.

## How the indicators are calculated

### Proportion of land area covered by forest

*The Proportion of land area covered by forest* is the forest areas as a share of total land area, where *land area* is the total surface area of the country less the area covered by inland waters, such as major rivers and lakes. As defined by the Food and Agriculture Organization of the United Nations in *Global Forest Resources Assessment, 2000*, *forest* includes both natural forests and forest plantations. It refers to land with an existing or expected tree canopy of more than 10 per

cent and an area of more than 0.5 hectare where the trees should be able to reach a minimum height of five metres. Forests are identified by both the presence of trees and the absence of other land uses. Land from which forest has been cleared but that will be reforested in the foreseeable future is included. Excluded are stands of trees established primarily for agricultural production, such as fruit tree plantations.

It should be noted, however, that National forest inventories and forest surveys are irregular in some countries and may be significantly out of date. Owing to climatic and geographical differences, forest areas vary in importance among countries. Longer time series may be difficult to compare directly without analysis of differences in definitions, methods and underlying data.

The proportion of total forest cover (including both natural forest and plantation) may underestimate the rate at which natural forest is disappearing in some countries.

### **Protected areas**

This indicator is defined as the percentage of total protected area (terrestrial and marine) on total territorial area (terrestrial area plus territorial sea area up to 12 nautical miles).

Protected area data are gathered and stored in the World Database of Protected Areas, which is hosted and maintained by the United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC) on behalf of the International Union for the Conservation of Nature (IUCN)-World Conservation Union World Commission on Protected Areas. The national data used to calculate the regional aggregates presented in this report are available from <http://sea.unep-wcmc.org/wdbpa/UN.cfm>. The database is constantly being updated by inserting newly established protected areas as well as information on already existing protected areas that are not yet recorded.

Although protected area data are currently based on IUCN management categories, these provide only a broad indication and differentiation of the way the areas are actually used and managed to conserve biodiversity. Providing more definitive information would require a more consistent and uniform adoption of the IUCN categories system by all countries – and an agreed standard definition of a protected area. At the moment, even the Convention on Biological Diversity definition of a protected area differs from that adopted by IUCN. If countries correctly and consistently applied the IUCN categories system, then the designations could be used as a more coherent indicator of policy commitment to biodiversity conservation and sustainable development objectives.

### **Energy intensity**

Energy use per units of PPP GDP is commercial energy use measured in units of metric tons of oil equivalent per \$1 million of GDP converted from national currencies using purchasing power parity (PPP) conversion factors. The ratio of energy use to GDP provides a measure of energy intensity. Differences in this ratio over time and across countries may reflect structural changes in the economy, changes in the energy efficiency of particular sectors, and differences in fuel mixes.

Commercial energy use refers to domestic primary energy before transformation to other end-use fuels (such as electricity and refined petroleum products). It includes energy from combustible renewable and waste, which comprises solid biomass and animal products, gas and liquid from biomass, industrial waste, and municipal waste. The underlying data on commercial energy production and use are from the International Energy Agency (IEA) of the OECD. IEA data for non-OECD countries are based on national energy data, adjusted to conform to annual questionnaires completed by OECD member governments. The IEA's data are published in its annual publications, *Energy Statistics and Balances of Non-OECD Countries*, *Energy Statistics of OECD Countries*, and *Energy Balances of OECD Countries*.

### **Greenhouse gas emissions**

Estimates of CO<sub>2</sub> emissions for all countries are available from the Carbon Dioxide Information Analysis Center (CDIAC) of the Oak Ridge National Laboratory. Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include contributions to the carbon

dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring. The CO<sub>2</sub> emission estimates are derived primarily from energy statistics.

Other important greenhouse gas emissions are methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) – mainly due to agriculture and changes in land use – and long-lived industrial gases such as chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphurhexafluoride (SF<sub>6</sub>).

### **Ozone-depleting substances**

Ozone depleting substances (ODS) are any substance containing chlorine or bromine, which destroys the stratospheric ozone layer that absorbs most of the biologically damaging ultraviolet radiation. The phasing out of ozone depleting substances, and their substitution by less harmful substances or new processes, are aimed at the recovery of the ozone layer. Substances controlled by the Montreal Protocol include CFCs (CFC-11, 12, 113, 114 and 115) and halons (1211, 1301 and 2402).

Ozone depleting potential (ODP) refers to the amount of ozone depletion caused by a substance. It is the ratio of the impact on ozone of a chemical substance compared to the impact of a similar mass of CFC-11. The ODP of CFC-11 is defined to be 1. Other CFCs and HCFCs have ODPs that range from 0.01 to 1. The halons have ODPs of up to 10.

CFCs are considered most representative of the protocol's efforts towards phasing out the use of ozone depleting substances and were the first to be targeted for elimination. Hence, they best depict the phase-out process for ozone depleting substances.

The consumption of CFCs is calculated as national production plus imports, minus exports minus destroyed quantities minus feedstock uses. For ODS (in this case, CFCs), the sum of national annual consumption of CFCs is multiplied by the estimated ozone-depleting potential of CFCs.

For a full list of the controlled substances as well as the control measures applicable to each group of substance, refer to the publication, *Production and Consumption of Ozone Depleting Substances under the Montreal Protocol: 1986–2000*, which is available on the Ozone Secretariat's website at <http://www.unep.org/ozone>.

### **Use of solid fuels**

Data on both fuel use and cooking can be gathered in surveys, as done in a number of Living Standard Measurement Surveys (LSMS), Demographic and Health Surveys (DHS), and national censuses. Development of standard and comparable questions for inclusion in all nationally representative household surveys, however, is essential. The following categorization of fuels provides measurable and predictive information on both the health and environmental impacts of household energy use: a) dung and crop residues; b) wood; c) charcoal; cii) coal; d) kerosene; e) gas and electricity.

Exposure to indoor air pollution depends on interactions of pollution source (fuel and stove type), pollution dispersion (housing and ventilation), and activities of household members. The type of fuel and participation in cooking tasks seem to be the most important predictors of risk. While large-scale monitoring of actual exposure in field conditions is excessively costly, household fuel-use patterns provide an easily measurable predictor of exposure. Using the type of fuel as indicator also provides a direct mapping to policy and intervention options as well as local and global environmental impacts. Fuel-use surveys will also allow monitoring of multiple fuel use, which is common in many households.

### **Access to an improved water source**

Access to improved water sources refers to the percentage of population who use any of the following types of water supply for drinking: household connection, public standpipe, borehole, protected dug well, protected spring, rainwater collection. Improved water sources do not include: unprotected well, unprotected spring, rivers or ponds, vendor-provided water, bottled water (due to limitations in the potential quantity, not quality, of the water), tanker truck water. Drinking water is defined as the water used for normal domestic purposes, including consumption and hygiene. Not all people that have



access to improve sources actually used them. Consequently, the primary indicator used to monitor progress in safe drinking water is the “use” of improved water sources.

### **Access to improved sanitation facilities**

The definition of basic sanitation would encompass critical components of what sanitation services should aim for: privacy, dignity, cleanliness and a healthy environment. From a monitoring point of view, however, such characteristics are difficult to measure. Access to improved sanitation facilities refers to the percentage of the population with access to: facilities connected to a public sewer or a septic system, pour-flush latrines, simple pit or ventilated improved pit latrines. These kinds of latrines are likely to be adequate, provided that they are not public or shared while open pit latrine and bucket latrine are considered “unimproved” sanitation facilities. Not all people that have access to improved sanitation facilities actually used them. Consequently, the primary indicator used to monitor progress in sanitation is the “use” of improved basic sanitation.

### **Estimates of slum population**

Data directly reporting on slum conditions globally has been extremely limited and, until recently, there was no standard definition of “slum”. In the absence of available data on the number of slum dwellers, estimates are based on an operational definition of slums and secure tenure as agreed at the October 2002 Expert Group Meeting convened by UN-HABITAT in Nairobi, Kenya.

According to this definition, a slum household is a group of individuals living under the same roof that lack *one or more*<sup>19</sup> of the following five attributes:

- Security of tenure (evidence of documentation can be used as proof of secure tenure status; not under threat of eviction).
- Structural quality/durability of dwellings (permanent structure – not earthen floor, type of wall or roof materials used – in compliance of building codes, not located in a hazardous area).
- Access to improved water (piped connection to house or plot; public standpipe; bore hole; protected dug well; protected spring; rain water collection; all sources should be within a suitable distance so as not to overburden the occupants).
- Access to sanitation facilities (direct connection to public sewer; direct connection to septic tank; pour flush latrine; ventilated improved pit latrine).
- Sufficient-living area (less than three people per habitable room).

The estimates, based on the new definition of slums, are at the country level and use national household survey data. More than 100 Demographic and Health Surveys (DHS), 55 Joint Monitoring Programmes (JMP) and 56 Multiple Indicator Cluster Surveys (MICS) informed the country level estimates of the urban condition. In countries where there were no DHS or MICS, UN-HABITAT relied on census data, other sources of national data or made missing value estimates based on similar-country experience. Households are asked to identify which category of access to water, sanitation, construction material and security of tenure applies to them. These categories are then used to classify the household as slum or no slum. Country estimates were added to obtain the regional and global totals. Due to changes in definition and methodology, these estimates cannot be compared with previous data sets produced by UN-HABITAT.