Chapter V

Environmental sustainability

Summary

- Progress has been made in some environmental areas since 1990: Ozone-depleting substances have been virtually eliminated, and the ozone layer is expected to recover by the middle of this century; terrestrial and marine protected areas in many regions have increased substantially; 147 countries have met the drinking water target, 95 countries have met the sanitation target and 77 countries have met both; and the proportion of urban population living in slums in developing regions fell notably.
- The international community must ensure that the United Nations Framework Convention on Climate Change (UNFCCC) process gives way to necessary cooperation between developed countries and the large, fast-growing developing countries in order to meet carbon dioxide (CO_2) emission-reduction targets.
- Efforts to protect forests will have to be combined with sustainable production and consumption patterns. It must be acknowledged that deforestation is caused by factors beyond the forest sector's control, necessitating integral approaches. The special role of forests in the life and livelihood of people living in poverty and indigenous peoples should be given adequate attention.
- Protection of certain terrestrial and marine areas can be simultaneously helpful for protection of forests, wetlands, biodiversity, water resources, fish stock, and so forth. This in turn is critical to avoiding economic hardships, social tension and conflicts. Addressing the issue of climate change should help in the protection of terrestrial and marine areas.
- Adequate drinking water and sanitation infrastructure can best be built through public initiatives, both at national and local levels, complemented by various community and non-governmental initiatives. Infrastructure should be environmentally friendly to avoid negative externalities that have emerged as access to drinking water and sanitation is expanded.
- The slums problem can only be solved through sustained, inclusive and equitable economic growth, grounded in sustainable patterns of production and consumption, sustainable urbanization, and deeper human development. Achieving this will take time; intermediate steps towards improving the lives of slum dwellers will need to be taken in the meantime.
- Going forward, coherent policies should make use of the interconnections between various environmental goals themselves and between environmental and human development goals in order to accelerate progress. This will require finding targets and indicators that capture these interlinkages in an integrated manner whose quantitative nature also permits better monitoring of progress.

Introduction

The MDG framework embraced multidimensional efforts to protect the environment which, unlike other MDGs, were designed to apply to all countries

In addition to human development aspirations, the Millennium Development Goals (MDGs) also embraced multidimensional efforts at both the international and national levels that were aimed at protecting the environment. MDG 7 was formulated to ensure environmental sustainability in recognition of a growing concern about current consumption and production patterns leading to an unsustainable use of natural resources. The purpose of this chapter is to review efforts made towards environmental sustainability during the 2000-2015 period, to understand the ways in which these efforts contributed to making progress towards environmental sustainability targets of the MDGs, and draw lessons for the implementation of the 2030 Agenda for Sustainable Development, and the Sustainable Development Goals (SDGs) in particular.

Any analysis of efforts to achieve MDG 7 is challenged by the unique features of this goal, especially the diversity of its targets (see the annex to this *Survey*). The targets are heterogeneous, covering both human development and environmental issues without proper integration; none of the environment-related targets were quantitatively specified; and some targets are not time-bound (for example, target A) whereas others are (for example, target B, which was expected to be met in 2010). Goal 7 also covers only a subset of the many challenging environmental issues that need to be addressed (Rockström and others, 2009). Moreover, while other MDGs are directed to either developing countries (MDGs 1-6) or developed countries (MDG 8), targets A and B are set for all countries, representing universality and the need for global cooperation, a feature that is more akin to the SDGs. One of the indicators for monitoring progress on MDG 7 refers to carbon dioxide (CO_2) emissions. This implicitly brings in the Rio principle of Common But Differentiated Responsibility (CBDR), given that developing countries will need some space to address emissions while working to develop more sustainable economic systems with higher levels of per capita income.

Environmental protection efforts worldwide during the 2000-2015 period are also unique in that they have not only responded to stimuli from the MDGs but also from several other sources, including (i) multilateral agreements, such as the UNFCCC, the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the Convention on Wetlands (Ramsar Convention); (ii) other regional initiatives; and (iii) spontaneous responses of individuals, communities, non-governmental and civic organizations, business organizations, and nations to growing environmental threats. Hence, unlike previous chapters where the focus was mostly on national policies and efforts, the review in this chapter gives more weight to internationally and regionally organized efforts as well.

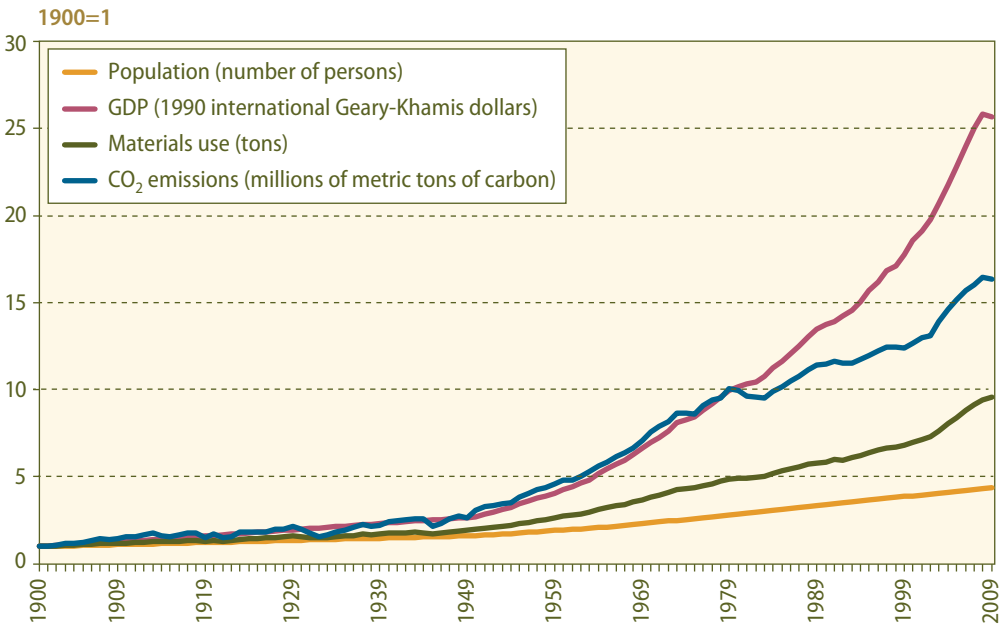
This chapter's review of environmental protection classifies the issues covered in MDG 7 into the following four major groups: (i) atmospheric issues; (ii) forests; (iii) land, water and biodiversity issues; and (iv) drinking water, sanitation, and slums. This grouping is neither exhaustive (that is, not all aspects of the environmental targets are covered with the same details) nor does it mean that there are no significant overlaps across these issues. For example, deforestation (a land-use issue) is a major driver of climate change and a major factor in sustainable water management. Similarly, success in ensuring improved drinking water often depends on the management of water resources. In fact, the importance of the overlaps across issues is underlined repeatedly in this chapter. Overarching lessons as well as lessons for specific areas of MDG 7 that emerge from the review of efforts are presented at the end of the chapter.

Protecting the atmosphere to combat climate change[1]

Continuous population and GDP growth has contributed to unsustainable resource use and growing volumes of waste generation

A growing concern about the unsustainable use of natural resources as a result of current consumption and production patterns prompted the MDG agenda to introduce environmental targets. The concern was well founded: continuous population and gross domestic product (GDP) growth has resulted in growing volumes of resources extracted and waste generated (figure V.1).[2] In fact, over time, the crisis has become more severe with regard to the absorption of waste—particularly CO_2 emissions, which continue to exceed the absorptive capacity of the atmosphere, oceans and forests.

Figure V.1
Global trends in population, GDP, resource use and CO_2 emissions, 1900–2009



Source: Data from Krausmann and others (2009) and Carbon Dioxide Information Analysis Center (CDIAC), United States Department of Energy.
Note: Krausmann and others (2009) define materials use as including biomass, fossil energy carriers, metal ores, industrial minerals and construction minerals.

A positive correlation has been established between growth and carbon emissions in developing countries (figure V.2a and figure V.2b), although CO_2 intensity in GDP has exhibited a downward trend. Even in developed countries (figure V.3), where post-industrial structural transformation, new technology, trade, outsourcing and certain environmental policies have resulted in a relative decoupling between carbon emissions and growth, emissions can still increase when GDP growth per capita accelerates beyond a certain threshold (i.e., above 2 per cent).

The decline in the emissions per unit of GDP is primarily the result of deployment of new, more fuel-efficient and lower-emitting technologies. This experience is sometimes put forward as evidence supporting the possibility of decoupling of growth from carbon emissions. However, the decoupling that this evidence shows is relative decoupling, while

1 This section draws extensively from Shindell (2015).

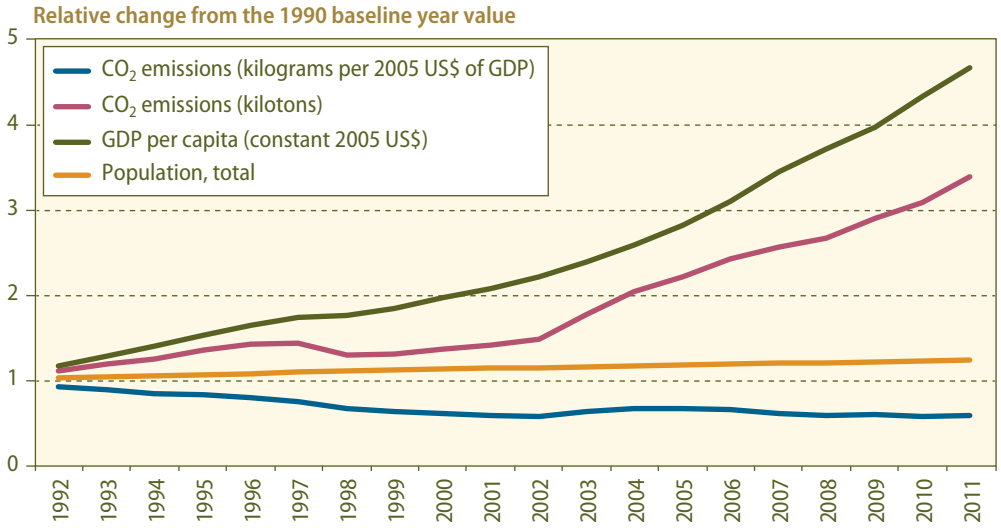
2 For more details, see United Nations Environment Programme (2012a).

what is needed for preventing climate change is absolute decoupling or, in other words, a reduction in the total volume of emissions. For now, GDP rises are produced with more CO_2 content; as a result, overall CO_2 concentrations are rising as well.

In view of the above, ozone depleting gases and CO_2 emissions became the central atmospheric issues covered by MDG 7, target 7A, on integrating the principles of sustainable development into country policies and programmes and reversing the loss of environmental resources.

Figure V.2a

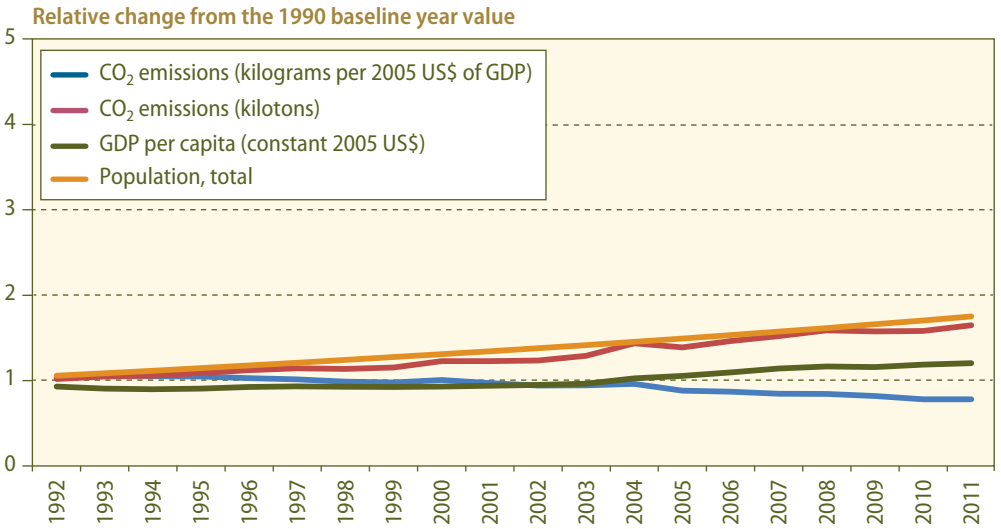
Trends in population, GDP and CO_2 emissions in East Asia and Pacific, 1992–2011



Source: World Bank, World Development Indicators Database.
Note: All indicators are normalized to 1 in 1990.

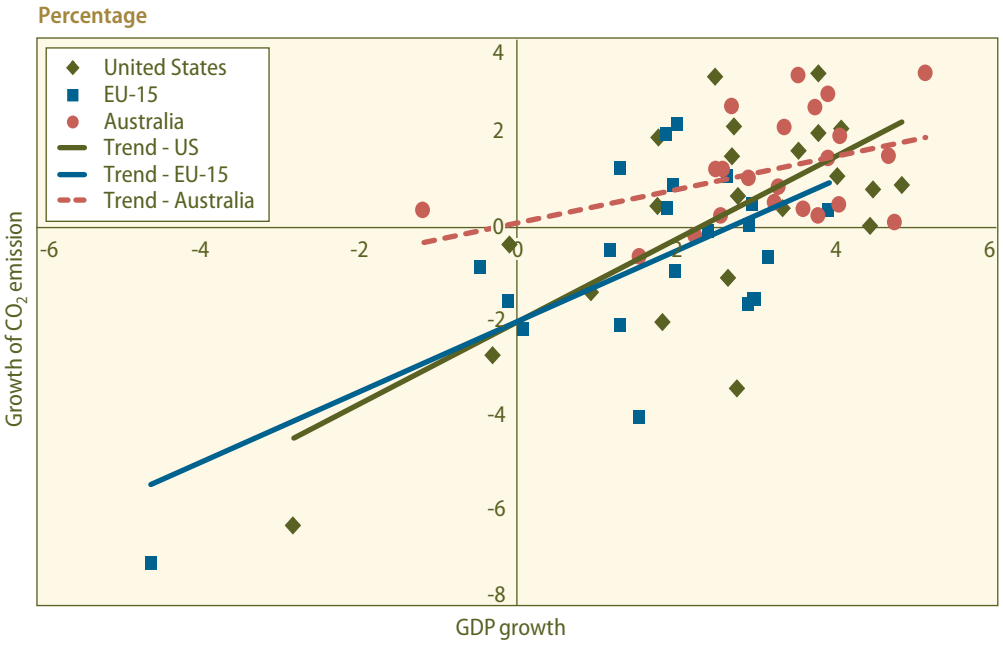
Figure V.2b

Trends in population, GDP and CO_2 emissions in sub-Saharan Africa, 1992–2011



Source: World Bank, World Development Indicators Database.
Note: All indicators are normalized to 1 in 1990.

Figure V.3
Carbon dioxide emission and GDP growth in developed countries, 1991–2012



Source: UN/DESA, based on data from the UNFCCC online database.
Note: EU-15 includes member countries of the European Union before the accession of 10 candidate countries on 1 May 2004.

The reduction of ozone-depleting substances

An encouraging example of global cooperation can be taken from the reduction in ozone-depleting substances

The experience with the ozone-depletion problem is an encouraging example of the world community coming together and successfully confronting a global environmental problem. Ozone depletion is caused by emissions of chlorofluorocarbons (CFCs), which also indirectly contribute to global warming and can cause health problems such as skin cancer. The atmospheric ozone-depletion problem was addressed by the 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, before the MDGs were launched. However, there have been continued efforts since 1987 that have led to encouraging results. Today, 197 parties have phased out 98 per cent of all major ozone-depleting substances globally compared to 1990 levels (United Nations, 2015a, p. 54). The remaining 2 per cent of all major ozone-depleting substances are expected to be phased out over the next 15 years. As a result, the ozone layer is projected to recover by the middle of this century. However, the concentration of CFCs in the stratosphere still remains high, because ozone-depleting substances have long atmospheric lifetimes. It is therefore important to remain vigilant against the emission of CFCs and other ozone-depleting substances.

Efforts to curb carbon emissions

Efforts to reduce carbon emissions have been mixed…

The Kyoto Protocol, an international agreement linked to the UNFCCC, was signed in 1997, just a few years before the MDGs were adopted, in hopes that the world would put a brake on the climate change process. However, there has been limited implementation of the Protocol. Because many important carbon-emitting countries never signed it, or first signed but later withdrew from it, many countries who signed it have found little incentive

for achieving the emission cuts to the stipulated extent. Furthermore, many developed countries who made progress in reducing emissions did so to a large extent by off-shoring their emission-intensive industries to developing countries (Cole, 2003, 2004, 2006; Pinter, Almassy and Bizikova, 2015; United Nations, Economic and Social Commission for Asia and the Pacific, 2013; and World Bank, 2008). At the same time, the volume of emissions by several fast-growing developing economies has increased sharply. As a result, the total volume of global emissions did not decrease; instead, it increased substantially between 1990 and 2009 (figure V.1).

There have, however, been some regional initiatives towards emission reduction. The most prominent among these is the European Union's (EU) Emissions Trading System (ETS), which uses the cap-and-trade system.[3] While the success of the ETS is questionable, it offers a valuable experience regarding operation and effectiveness of the cap-and-trade system.[4]

…although some developed countries have taken important steps…

Some developed countries have gone beyond what was stipulated under international or regional agreements and achieved significant reduction of their emissions and are continuing to press ahead with further reductions in the future. For example, Denmark has declared an initiative to become carbon neutral by 2030. Norway has also set a similarly good example. Germany has reduced emissions significantly while at the same time switching away from nuclear power. These forward pledges are intended to set a tone for more ambitious commitments by other countries in the context of a future global agreement.

There have been some initiatives of developed countries towards helping developing countries to reduce their emissions. One example was the Kyoto Protocol's Clean Development Mechanism (CDM), under which enterprises from developed countries could earn emission-reduction credits by undertaking emission-reducing activities in developing countries. Unfortunately, the scope of CDM activities remained limited, and they were concentrated in only a few large, fast-growing developing countries, such as China and India. Nevertheless, several global funds have emerged to promote such activities.

...and some developing countries have made commendable efforts

Many developing countries also took commendable steps to reduce their carbon emissions, even though they were not required to do so under the Kyoto Protocol. Some even have announced the intention to become carbon neutral in the near future. An example is Costa Rica, which has declared the goal of reducing CO_2 emissions gradually until achieving zero net emissions by 2020. Some developing countries (China, for example) have set the broader goal of pursuing a different production and consumption pattern that is more environmentally friendly and conducive to a reduction in CO_2 emissions (Xinhua, 2014).

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3 A cap-and-trade system sets a cap for emissions and then distributes authorizations to emitting sources in the form of emissions allowances. Emitting sources can then take different strategies to meet the cap, one of which is to sell or buy emissions allowances. For more details, see United States Environmental Protection Agency, http://www.epa.gov/capandtrade/basic-info.html.

4 The overly generous allowance of free emission permits given under the Emissions Trading System (ETS) to corporations has kept carbon pricing well below $50 per ton, which is considered by many climate experts as a minimum for enabling the structural economic transformations required for a transition towards a sustainable development path. In the European Union's (EU) ETS, carbon prices hovered between €10 and €15 between 2005 and 2010. Prices collapsed to €3 in early 2013 before recovering gradually to slightly above €8 by the third quarter of 2015 (Organization for Economic Cooperation and Development, 2013a; Spash, 2010).

Forest cover loss and efforts to avert it[5]

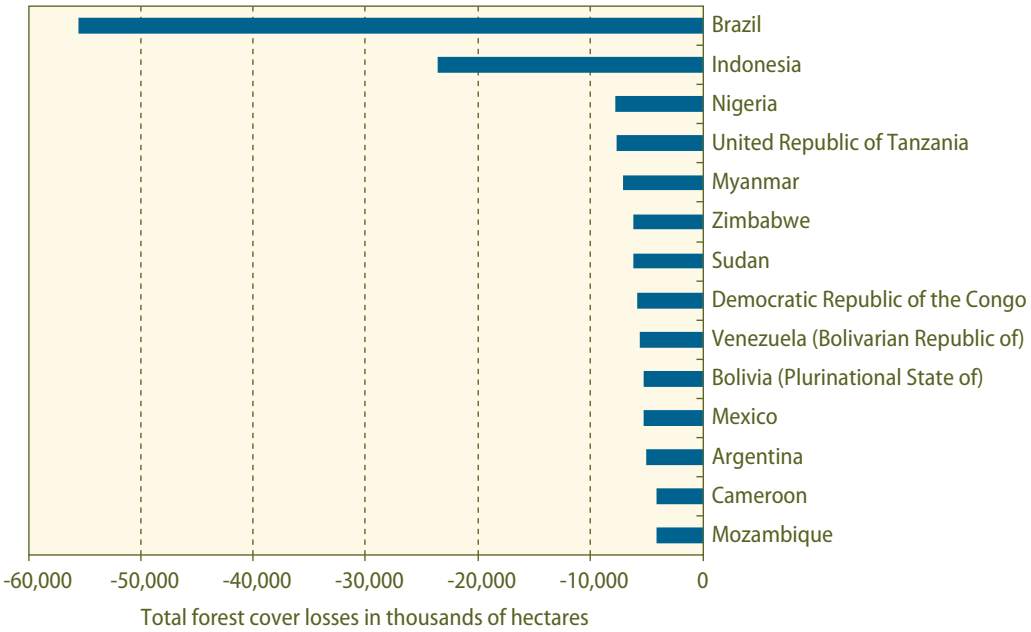
Forests are a critical determinant of the global as well as the local environment. By absorbing carbon from the atmosphere and releasing oxygen, forests ensure one of the essential conditions for survival of life on the planet. They provide watershed protection and biodiversity conservation, and help to combat desertification and land degradation and to reduce the impact of natural disasters. Forests also help solve many development challenges including poverty eradication, food security and agriculture, energy, and clean water.

Forest loss has been limited when examined from a global perspective but it has been much more significant in a number of countries

Forests are not explicitly referred to in any target of MDG 7, but the proportion of land area covered by them features among the indicators for monitoring progress on the goal (see annex). The United Nations MDG database shows that, globally, the proportion of land area covered by forest decreased 1 per cent (from 32 to 31 per cent) between 1990 and 2010. In absolute terms, total forest cover decreased from 4,168 million ha in 1990 to 4,085 million hectares (ha) in 2000 and 4,033 million ha in 2010, implying a net loss of 135 million ha of forest cover. This is approximately equivalent to the territory of a country like Iran, Mongolia or Peru. This trend confirms that the loss of forest areas has been continuing, although at a slower pace: the annual rate of forest-area loss decreased from 8.3 million ha in the 1990s to 5.2 million ha per year over the last decade.

These statistics, however, mask the real loss of primary forests that is taking place. This becomes clear if attention is paid to the cases of greatest forest loss. Figure V.4 shows that, between 1990 and 2010, Brazil lost 55.3 million ha of forests (representing 6.6 per cent of its total forest cover) and Indonesia lost 24.1 million ha (representing 13.3 per

Figure V.4
Countries with largest forest-area loss between 1990 and 2010



Source: Pinter, Almassy and Bizikova (2015), based on United Nations Statistics Division data.

5 This section benefited from Pinter, Almassy and Bizikova (2015).

cent of its total forest cover). Thus Brazil and Indonesia together lost about 80 million ha of forests, which, in most cases, are primary forests, dense and rich in biodiversity, representing unique ecosystems that are often the habitat of indigenous peoples. Other developing countries—not shown in the figure—have also recorded considerable rates of forest loss in terms of percentage of forest-area loss, including Cambodia, the Democratic People's Republic of Korea, Ecuador, Ghana, Honduras, Indonesia, Myanmar, Nicaragua, Timor-Leste and Zimbabwe. Of the countries experiencing deforestation, many were least developed countries (LDCs), landlocked developing countries, and small island developing States (SIDS) (table V.1).

Table V.1
Countries/areas with the highest proportion of deforestation, 1990–2010

Total forest land area (percentage)				
	Country or area	1990	2010	Change (1990–2010)
Least developed countries	Cambodia	73.3	57.2	-16.1
	Timor-Leste	65.0	49.9	-15.1
	Myanmar	59.6	48.3	-11.3
Landlocked developing countries	Zimbabwe	57.3	40.4	-16.9
	Paraguay	53.3	44.3	-9.0
	Uganda	24.1	15.2	-8.9
Small island developing States	Montserrat	36.4	20.0	-16.4
	Timor-Leste	65.0	49.9	-15.1
	United States Virgin Islands	68.6	58.8	-9.8

Source: UN/DESA, based on United Nations Statistics Division data.

Drivers and effects of deforestation

Understanding the drivers of deforestation is critical to identifying the policies that can tackle this problem. Major drivers of deforestation in developing countries have been population pressure, poverty-generated fuel needs, urbanization, and logging by domestic and international forest companies for both timber extraction and plantation of various commercial crops. Weak governance and institutions characterized by corruption among their officials exacerbate the problem (Kuyuncu and Yilmaz, 2009) (see also chap. VI).

In Honduras, the country with the highest degree of forest loss (26.3 percentage points between 1990 and 2010), deforestation was mostly the result of livelihood-related activities, such as forest clearing for farming and fuelwood collection. Timber extraction (often illegal and uncontrolled), mining and forest fires have further accelerated the losses there.[6] Similarly, in the Democratic People's Republic of Korea, which experienced a loss of forest cover of 21 percentage points between 1990 and 2010, the rural population extensively converted forest areas to agricultural lands and cut forests for fuelwood and building materials (Pang and others, 2013). In Zimbabwe, where forest cover decreased by 16.9 percentage points between 1990 and 2010, deforestation was also the result of intensifying

6 For more details, see: http://rainforests.mongabay.com/20honduras.htm.

livelihood activities, although land clearing for tobacco production also accelerated the negative trends (Food and Agriculture Organization of the United Nations, 2010).

Rising inequality, erosion of land rights, conversion of forest as a result of livelihood-related activities and timber extraction are all drivers of deforestation

Rising inequality and erosion of rights of indigenous peoples living in forests have also been found to be a factor aggravating deforestation and forest degradation (Baland, Bardhan and Bowles, eds., 2007). Gender inequality also plays an important role. In her survey of community forest management in India, Agarwal (2007) finds that the presence of more women members in the management committee led to better protection of forests.

The relative importance of the various drivers of deforestation is changing over time. The earlier pattern of deforestation, characterized mainly by government-assisted land clearing by small-scale farmers, has given way to large-scale forest clearing by better capitalized landowners for cattle ranching and plantation of commercial crops (Rudel and others, 2009). Since globalization and economic growth-driven demand for timber doubled in terms of value during the first decade of the new millennium, the pressure on the forests has increased. China and India together accounted for more than 86 per cent of tropical hardwood imports by International Tropical Timber Organization (ITTO) members in 2011, compared with 22 per cent in 1995.[7] The pressure from plantation also grew. Between 1990 and 2005, there was a 40 per cent increase in forest plantations, a trend that continued to hold (Rekacewicz, 2009). The value of plantation forests for biological diversity and related ecosystem services is significantly less than that of natural and old-growth forests (Brockerhoff and others, 2008; Stephens and Wagner, 2007).

Deforestation has had negative effects on other environmental and human development outcomes. In Cambodia, where timber is one of the few resources with commercial value, loss of forests by 16 percentage points between 1990 and 2010 has negatively affected water resources and, as a result, the agriculture and fisheries sector (Cambodia, Ministry of Planning, 2013). In Zimbabwe, deforestation threatens both food and income security of the rural population (Food and Agriculture Organization of the United Nations, 2014). In Timor-Leste, deforestation has led to landslides and chronic soil erosion and has reduced water quality, threatening wildlife and representing a risk to the food supply (Secretariat of the Convention on Biological Diversity, 2014).

Unlike many developing countries, developed countries in general did not suffer significant deforestation during the 1990-2015 period. There are several reasons for this outcome, as Pinter, Almassy and Bizikova (2015) explain. First, loss of forest cover that is generally associated with industrialization and urbanization had already occurred in these countries. Second, the economic structure of developed countries moved further towards services, thus reducing pressure on forests and resources generated by forests. Third, as was the case with CO_2 emission-intensive industries, developed countries rely more on developing countries in meeting a significant part of their demand for timber and other forest resources. Fourth, many developed countries took steps to protect their forests in the context of the European Commission's NATURA 2000 initiative, which was established in 1992, and its Habitats Directive, which provides the basis for conservation policy (Evers, 2015).

7 While China has increased its forest cover, it is increasingly relying on imported timber, transferring the ecological pressure to other countries (United Nations, Economic and Social Commission for Asia and the Pacific, 2013).

Efforts for averting deforestation

Amid the negative developments with regard to forests in developing countries, particularly with those with very low per capita income, there have been some encouraging experiences too. Several developing countries and regions experienced a sustained expansion in forest cover (Pinter, Almassy and Bizikova, 2015). Among them were Puerto Rico, Viet Nam, Cuba, Bulgaria, Swaziland, China, Rwanda, Uruguay, Serbia, and Belarus (figure V.5). In 12 countries, forest cover increased by more than 5 percentage points, and in 4 of these, the increase was more than 10 percentage points.

A number of initiatives have contributed to reforestation in some developing countries; alas, new forests are of lower quality with reduced biodiversity

The factors behind the increase in forest cover were generally specific to individual countries. For example, forest cover increase in Puerto Rico was largely a result of structural transformation, involving a shift from agriculture to a service-based economy. In 1945, only 9 per cent of the Puerto Rican island was covered with forests, but after abandonment of pasture and coffee plantations, the forest areas started to increase dramatically as a result of natural regeneration, and by 2010 as much as 62 per cent of the island was forested.

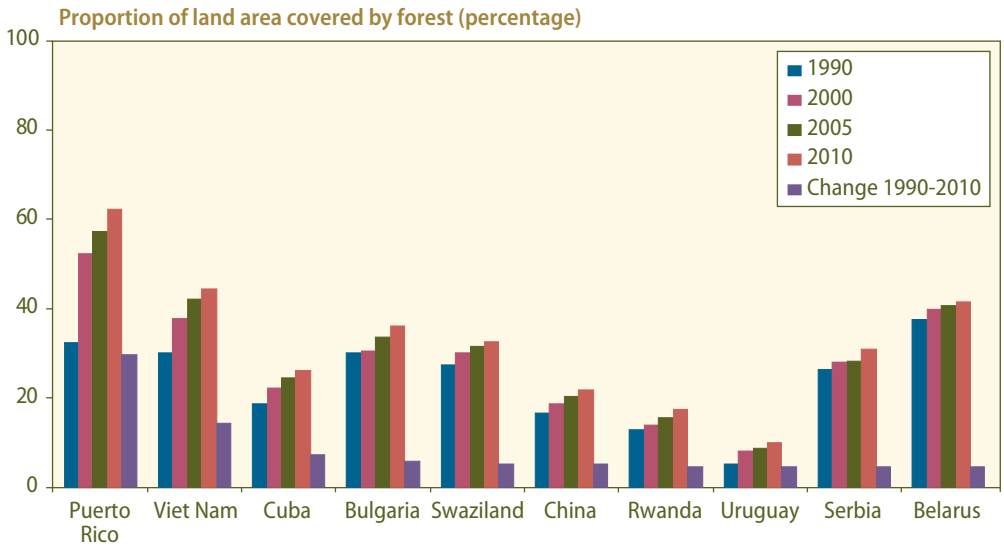
In China, the forest cover increased by 5.2 percentage points or 19.86 million ha, in absolute terms, between 1990 and 2010. This was possible as a result of the Great Green Wall programme that tackled desertification and land degradation in Inner Mongolia and Western China. Desertification was increasing the frequency of major sandstorms and contributing to the worsening of urban air quality in the megacities of China's eastern seaboard.

Viet Nam experienced an increase in forest cover by 14.3 percentage points (4.43 million ha, in absolute terms), between 1990 and 2010, through a series of national policies, partnership initiatives and legal mechanisms that enforced forestry certification standards, encouraged dialogue between different stakeholders, and granted land tenure rights to local communities.

The afforestation and reforestation efforts in the countries above and in other countries are commendable and encouraging. However, as noted earlier, the quality of these "new" forests is nowhere close to the primary forests lost in many countries. More than half of the

Figure V.5

Countries with a high degree of afforestation, 1990–2010



Source: Pinter, Almassy and Bizikova (2015), based on United Nations Statistics Division data.

total reforested areas are industrial (coffee, tea and rubber) plantations with a significantly lower biodiversity value. Also, the value and the quality of natural (moderate and mangrove) forests have continued to decline (Secretariat of the Convention on Biological Diversity, 2014). Although global timber demand has doubled, there has been a structural shift to secondary wood products—which are generally produced from residual forests, new growth forests, and social forests where trees possess less height and width compared with trees in primary forests—indicating that the remaining forest is of lower quality with reduced biodiversity (Earth Policy Institute, 2012).

Eco-services payments systems and environmental cash transfer programmes of countries have helped to conserve existing forests…

In addition to the reforestation and afforestation initiatives above, there have been commendable efforts at conservation of existing forests in some developing countries. A particular example in this regard is Costa Rica, which introduced an Eco-services Payment System to encourage farmers and owners of forest land to preserve the forests. Some have complained, however, that such payments went inordinately to rich landowners and thus exacerbated inequality. Despite these complaints, it still represents a policy innovation undertaken in a developing country.

Another novel initiative was taken by Ecuador, which announced its intention not to develop the oil fields in its Yasuni National Park in order to protect the rain forests there (Martin, 2011). It was expected that the international community would come forward with some compensation for the financial loss that Ecuador was suffering as a result of this initiative. Unfortunately, insufficient funds were committed owing to, among other things, unease about the continued possibility of future exploitation of the oil resources and issues with competition between this programme and the Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative. As a result, the project was scrapped in 2013 (Martin, 2014). This initiative provides an example of potential global cooperation for protection of the forests, but further efforts will be needed regarding attracting and allocating funds for this to be successful.

Innovative social policies have also been seen as instruments to protect forests, in a synergy favouring simultaneous progress towards multiple MDGs. As briefly mentioned in chapter III, as part of environmental conditional cash transfer programmes, Governments are also providing direct transfers to communities and families with land titles in the Amazon basin in exchange for the protection of large areas of tropical forests and ecosystems. There is evidence that the Bolsa Floresta programme in Brazil has reduced the forest loss 12 per cent faster in the reserves that have benefited from the transfer. This example, once again, shows there is scope for policies that are coherent in the sense that they allow for synergies and outcomes at the social and environmental levels.

…while there have also been important examples of global efforts to reduce deforestation

As pointed out earlier, developed countries in general did not suffer significant deforestation between 1990 and 2015. Even so, they have taken initiatives to protect their forests. Moreover, one of the important developments during the period since the MDGs were adopted was the emergence of several global initiatives to protect forests. These initiatives reflected the realization on the part of the world community that forests, although located in individual countries, are in fact treasures for the world community as a whole. For example, Brazil's rainforests are often referred to as the "lungs of the earth", and hence their importance for humankind as a whole is invaluable. Brazil and Indonesia still have high forest coverage of about 60 per cent and 50 per cent, respectively. It is important that these forests are sustainably managed and protected.

Prompted by this realization, several global initiatives emerged with the explicit purpose of aiding countries in protecting their forests and valuing the services that forests

provide. The REDD+ initiative, mentioned above, is an example of such global initiatives. In some cases, bilateral development assistance was directed towards forest protection in recipient countries. Debt relief programs, such as the Heavily Indebted Poor Countries (HIPC) initiative and Multilateral Debt Relieve Initiative (MDRI), contained some components aimed at forest protection in the countries receiving debt relief. The financing strategy of the CBD is an important aspect of globally shared responsibility for protecting biodiversity and, by implication, forests.

It is difficult to assess how successful these global funds and initiatives have been in protecting the forests. The evidence regarding deforestation suggests that the success was perhaps modest, and they could not prevent the loss of a substantial portion of the Earth's remaining primary forests.

Reducing biodiversity loss[8]

Target B of MDG 7 sought to "reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss". This can be considered as a composite target, as monitoring its achievement was based on indicators focused on the protection of terrestrial and marine areas, water resources, fish stock and biodiversity (see annex). The evolution of these indicators and global and national efforts to improve them are reviewed next.

Protection of terrestrial and marine areas

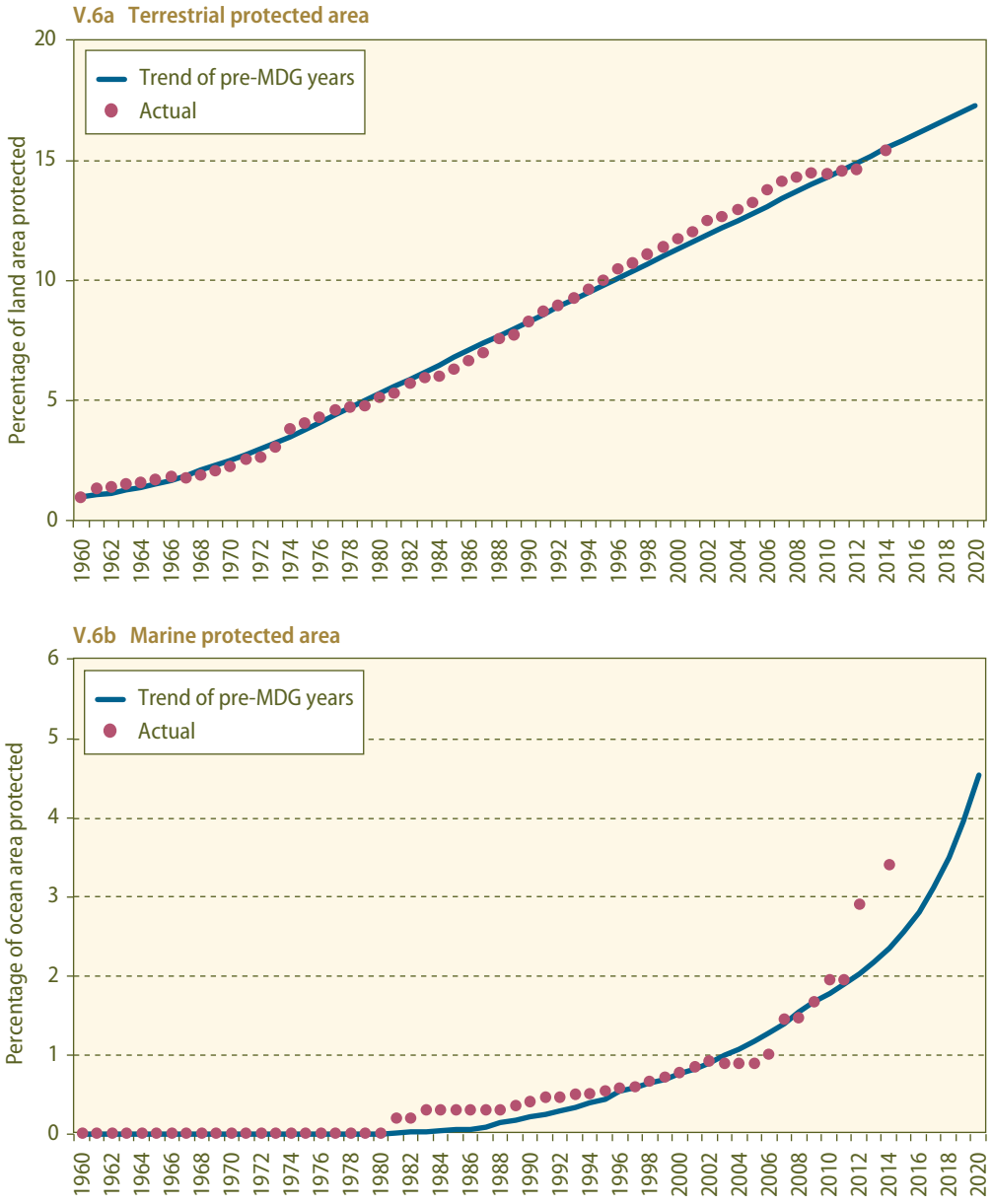
The trend of protecting terrestrial areas continued at roughly the same rate pre- and post-MDG adoption, whereas marine area protection ramped up more recently

Progress in protecting land and marine areas that was achieved before the MDGs also continued after these goals were adopted. However, there was a marked difference in this regard between land and marine areas. The rate of increase in protected land areas in recent years followed the trend of the pre-MDG years, and, in fact, it seems to have slowed down, whereas that of protected marine areas seems to have accelerated since about 2005 (figure V.6). This is in part because the concept of marine protected areas (MPAs) is relatively recent, and also the establishment of exclusive marine zones belonging to particular countries is a relatively recent step. MPAs were initially defined at the Fourth World Wilderness Congress (1987-1988), which also established objectives and targets for their protection. Further protection efforts were influenced by the United Nations Convention on the Law of the Sea (UNCLOS) and the CBD coming into force in 1994. These both established the obligations and rights for countries to create MPAs. While this provided some of the impetus for the increase, there was a more rapid increase after the World Summit on Sustainable Development Plan of Implementation in 2002, which raised the profile of ocean protection on Governments' agendas. Partly as a result of this, there was an increase in the total ocean area protected of over 150 per cent between 2003 and 2010 (Toropova and others, eds., 2010). This rapid increase is also likely to be partly a function of the relative scarcity of MPAs at the beginning of the period.

In terms of regions, the largest increase in protected terrestrial area was seen in Latin American and Caribbean countries, where it increased from 8.8 per cent in 1990 to 23.4 per cent in 2014 (United Nations, 2015a, p. 56). There are a number steps that countries in the region have taken in order to increase terrestrial protected areas, at both the individual country level as well as regionally. Many countries have enacted new forest legislation

8 This section draws extensively from Pinter, Almassy and Bizikova (2015) and Evers (2015).

Figure V.6
Trends in protection of terrestrial and marine areas, 1960–2020



Source: Secretariat of the Convention on Biological Diversity (2014); Pinter, Almassy and Bizikova (2015); and Juffe-Bignoli and others (2014).

(although some of this was prior to the signing of the MDG declaration). There are also a number of regional collaborative efforts including the Amazon Treaty Cooperation Organization, the Central American Commission on Environment and Development, the Caribbean Natural Resources Institute, as well as regional technical cooperation networks and regional fire management networks (Food and Agriculture Organization of the United Nations, 2007). In addition, many countries in the region have made use of the National Forest Programme Facility which has provided grants to numerous organizations, both at the local and national government level and to local and national NGOs. The

Facility, created in 2002, has helped support the formulation and implementation of many countries' national forest programmes (Food and Agriculture Organization of the United Nations, 2012).

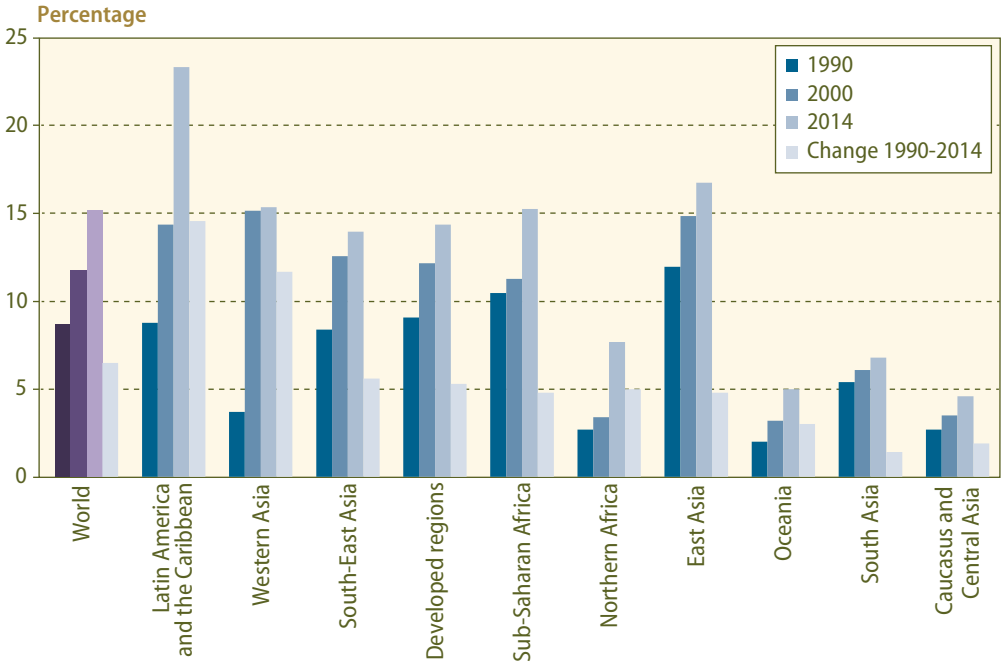
The lowest increase in protected terrestrial area was observed in Caucasus and Central Asia, where it increased from 2.8 to 3.6 percent during 1990-2012 (figure V.7). Among countries that achieved the largest increase in the proportion of terrestrial area protected are Bhutan, Bulgaria, Cambodia, Congo, Croatia, French Guiana, Morocco, Namibia, Peru, Réunion, Slovenia; however, important emerging economies such as Brazil and Mexico also increased their proportion of protected areas considerably (Pinter, Almassy and Bizikova, 2015). As a group, LDCs seem to have faced considerable challenges in increasing protected areas.

The better performance of Slovenia and Bulgaria, for example, is explained largely by their accession to the EU in 2004 and 2007, respectively. The accession required these countries to meet the requirements of the European Commission's NATURA 2000 programme. This programme involves increased protection of over 1,000 animals and plant species and over 200 habitat types (Evers, 2015). As a result, as part of the accession process, Slovenia and Bulgaria increased the coverage of protected areas. Namibia has enacted legislation for sustainable biodiversity management and invested in management and infrastructure in protected areas. In the Lao People's Democratic Republic, Prime-Ministerial decree number 164 increased protected areas. In addition, improvements in local biodiversity knowledge, land-use planning and allocation and an expansion of ecotourism have all helped to increase protected areas (ibid.).

Desertification and land degradation continues despite protection efforts, particularly in Africa

Of equal importance to the deceleration in the rate of increase in protected land areas in recent years is the problem of desertification of land. Restoring the Earth's degraded and

Figure V.7
Increase in the proportion of protected terrestrial area, various regions, 1990–2014



Source: Pinter, Almassy and Bizikova (2015), based on United Nations Statistics Division data.

desertified land is a complex and huge challenge. Despite widespread ratification of the UNCCD and the adoption of National Action Plans in many countries, the results have been mixed at best, as reflected in the rapid and continued desertification and degradation of land, especially in Africa, but also in Latin America (United Nations Environment Programme - World Conservation Monitoring Centre, 2011). According to United Nations, Convention to Combat Desertification (2014), 25 per cent of land is highly degraded and 8 per cent moderately degraded, while only 10 per cent is improving. About two thirds of African land has already been degraded to some degree. Land degradation affects at least 485 million people, comprising 65 per cent of the entire African population. It is projected that by the 2050s, 50 per cent of agricultural land in Latin America will be subject to desertification (Pinter, Almassy and Bizikova, 2015). The progress in increasing the extent of protected terrestrial area should be helpful for combating forest loss and degradation. Yet, the evidence pointing to increasing desertification suggests that bolder efforts are needed.

Insufficient protected area coverage of biomes is most evident in the marine realm, where only 1.6 per cent of territorial water is protected, despite the CBD Aichi conservation target of 17 per cent of terrestrial and inland water areas and 10 per cent of marine and coastal areas. Indeed, at the end of 2010, only 12 countries designated more than 10 per cent of their waters as protected, most of them already prior to 1990, while 121 countries were yet to designate more than 0.5 per cent of their marine jurisdiction in the same direction (Toropova and others, eds., 2010). On the positive side, 6 countries have a proportion of marine protected areas of more than 30 per cent according to recent United Nations statistics. Some countries reported a large increase in protected marine area in order to meet the requirement of regional agreements. This was the case with Romania, for example, which increased its protected marine area significantly to fulfil the requirement of the European Commission's NATURA initiative (Evers, 2015). A large Black Sea reserve was established in 2007, prior to Romania's EU accession, as part of compliance with this directive (Begun and others, 2012).

Wetlands

There were ongoing efforts to protect wetlands throughout the period since the MDG declaration was signed. Protection of terrestrial area subsumes protection of wetlands. However, wetlands comprise only 1 to 2 per cent of the global terrestrial area and scientific estimates show that 64 per cent of the world's wetlands have disappeared since 1900. The Wetlands Extent Index corroborates that, for a global sampling of more than 1,000 wetland sites, these sites shrank by an average of 40 per cent over the period between 1970 and 2008. Individual wetlands and regions vary widely, but the continuing trend is unmistakable and alarming (figure V.8).

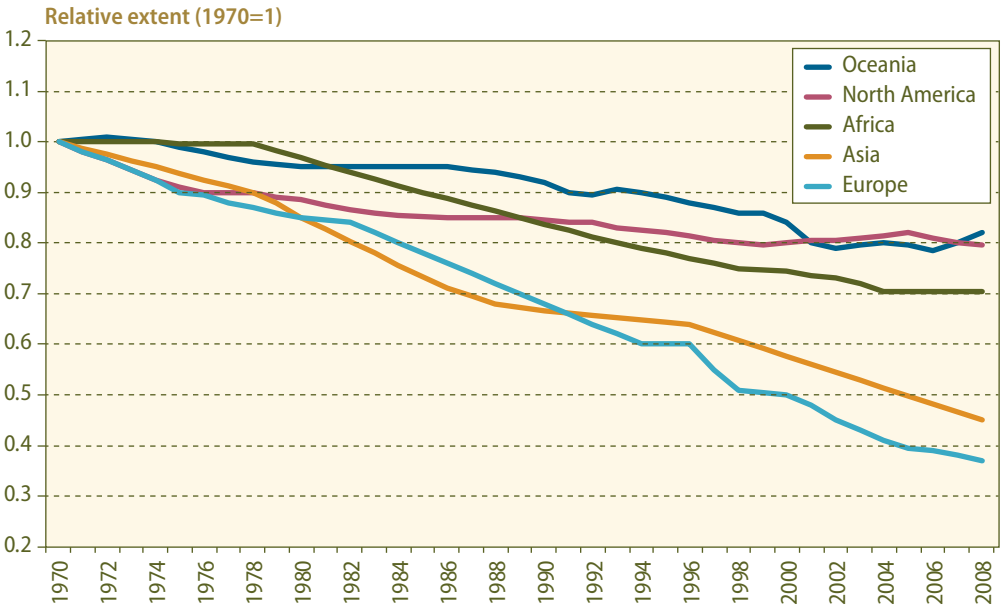
Some success in protecting wetlands has come through national policy frameworks and legislation

At the same time, MDG 7 was not expected to result in any significant increase in the total area of protected wetlands since the largest wetlands were already protected before these goals were adopted. However, LDCs, SIDS and large, environmentally important developing countries increased the number of protected sites by almost threefold between 2000 and the present (Pinter, Almassy and Bizikova, 2015). It appears that some of the success in increasing these areas came as a result of integrating wetland management into high-level national strategies, including development plans and overall environmental strategies. Furthermore, wetland protection was mainstreamed into relevant sectoral strategies such as poverty reduction and coastal development. However, effective monitoring

and enforcement remain problematic and limited, and evidence suggests there continues to be degradation or loss of protected wetlands due to natural causes and conversion to agriculture and industrial use (ibid.; United Nations Environment Programme, 2012a).

In many countries, the protection of wetlands is linked to existing national policy frameworks and legislation that have an important role in mainstreaming these issues into sectoral planning, including development plans and expansion of urban and agricultural areas. Sri Lanka, for example, included acreage of protected wet-zone forests as an indicator under MDG 7. The country has enacted a number of environmental and natural resource policies including a National Watershed Management Policy (2004), the National Wetlands Policy (2005) and the National Wetland Conservation Plan (2004), among others (Institute of Policy Studies of Sri Lanka, 2014). Mainstreaming wetland protection also contributes to integrating the monitoring of wetlands into broader existing monitoring systems, which may contribute to improving protection. Based on a comparison of countries with and without National Wetland Protection legislation, those with existing legislation were about 30 per cent more likely to report healthier sites than those without such legislation (United Nations Environment Programme, Twelfth Global Meeting of the Regional Seas Conventions and Action Plans, 2010).

Figure V.8
Wetlands Extent Index, 1970–2008



Source: Wetlands Extent Index as published in Leadley and others (2014).

Water use

Water scarcity is becoming more acute in many developing countries…

The other water-related indicator of MDG 7 focuses on the proportion of water resources used. The situation in this regard is deteriorating in developing countries, which are using on average more than half of their total water resources. Several of them already exceed sustainable capacity. However, relevant data are acknowledged to be of poor quality. Countries in dryer regions, such as Western Asia, some parts of sub-Saharan Africa, and SIDS, are most affected by depletion of water resources. However, developed regions such

as Oceania or the South Western United States also regularly suffer from water scarcity (United Nations Environment Programme, 2012b).

The problem of water scarcity is getting more acute. Apart from drivers from the demand side, the problem is aggravated from the supply side by climate change. In many cases, lakes are drying up as a result of prolonged droughts. Growing scarcity of river and lake water is becoming an important source of economic hardship, social tension and even military conflicts.

...while increased use of Integrated Water Resources Management plans has been important in those countries making progress

For the countries that have managed to make progress in reducing their water use, Integrated Water Resources Management (IWRM) has been important, although this concept pre-dates the MDGs. Many countries have made progress in developing IWRM, but further efforts are necessary to ensure effective implementation (Evers, 2015). A survey in 2012 by UN-Water showed that 84 of 133 countries had water resources management plans developed. However, this survey included high-income countries as well and found that, while low-income countries were in the process of developing plans, there was limited implementation between 2012 and a previous survey in 2008 (United Nations Environment Programme, 2012b). Uzbekistan, for example, was able to reduce its proportion of water resources consumed by setting clear policy targets for water use, savings and supply. Local strategies can be relevant too; for example, China's province of Liaoning has considerably reduced pollution of local water resources and improved efficiency through integrating national legislative frameworks with local institutional frameworks and projects (Evers, 2015).

Fish stock

The world's production of food fish reached about 110 million tons in 2006, providing a per capita supply of 16.7 kg (live weight equivalent), consumed mainly in rich countries. The proportion of marine fish stocks that are overexploited, depleted or recovering from depletion rose from 10 per cent in 1974 to 32 per cent in 2008 (Food and Agriculture Organization of the United Nations, 2010; Worm and others, 2009).

The problem of overfishing has become particularly acute in the Atlantic Ocean, the Mediterranean Sea and the Black Sea where, in many parts, 50 per cent or more of fish stocks are outside their safe biological limits. The problem is less serious for the Pacific Ocean, although even there—particularly in the eastern central, northeast and southwest Pacific Ocean—about 10 per cent of fish stocks are overexploited (Environmental Performance Index, 2014, cited in Evers, 2015).

By contrast, some positive trends in fish stocks can be noticed, especially among SIDS, for whom fisheries and ecotourism are important economic sectors. Ensuring sustainability of the fish stock is therefore a necessary condition for sustainable economic development in these countries. Some developing countries other than SIDS have also paid attention to protection of fish stocks. For example, Cambodia and Ghana included the status of fish stocks as an indicator under MDG 7, and the Fisheries Administration in Cambodia has established fish sanctuaries covering over 46,000 ha (Cambodia, Ministry of Planning, 2013; Ghana, National Development Planning Commission and United Nations Development Programme, 2010).

Biodiversity

Vanishing biodiversity is one of the major indicators to show the high degree of deterioration of ecology and environment. According to the Red List Index, which is available only at the global level, the proportion of endangered species expected to become extinct in the near future increased from 7.9 per cent in 1990 to 8.7 per cent in 2012.

The main factors of biodiversity loss include habitat loss and degradation, overexploitation of wild species, spread of alien invasive species, climate change and pollution. As biodiversity has already declined significantly in developed countries, the most recent negative changes were registered in developing countries with a higher baseline (Pinter, Almassy and Bizikova, 2015). Of the 133 local, regional and global extinctions of marine species documented worldwide over the last 200 years, 55 per cent were caused by overexploitation, while the remainder was driven by habitat loss and other threats (Dulvey and others, 2008).

Improved protection efforts may have helped to slow the rate of increase of biodiversity loss

While the percentage of threatened species is still increasing, the rate of increase has somewhat slowed down, likely as a result of improved protection efforts (Oxfam, 2013). The positive initiatives taken by many countries to increase their forest cover and to expand the proportion of protected terrestrial and marine areas should be helpful for preservation of biodiversity. Some countries introduced special indicators in MDG 7 to protect biodiversity. For example, Nepal included an indicator related to biodiversity of wetlands, and Viet Nam paid attention to the number of endangered species (United Nations, Economic and Social Commission for Asia and the Pacific, 2013). Nepal has implemented a Water Resource Strategy (2002) as well as a National Wetland Policy (2003), while the National Adaptation Plan of Action addresses issues of biodiversity at the watershed and landscape levels (Nepal, National Planning Commission, 2013). Viet Nam has tracked the number of threatened and endangered plant and animal species, although the results have been mixed as these numbers have been increasing along with reports of environmental violations (Viet Nam, Ministry of Planning and Investment, 2013). It is difficult to determine whether the increase in reported violations is a result of increased stresses on the environment or greater levels of enforcement of environmental rules.

Improving drinking water, sanitation and slums[9]

The second part of MDG 7 (targets C and D) was devoted to the human development challenges concerning improving access to safe drinking water and basic sanitation, and living conditions in slums. Target C of this goal sought to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. Target D was added in 2007, following a UN-Habitat (2003) report, which flagged slums as a major and growing challenge. It was formulated to have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.[10]

9 This section draws extensively from Satterthwaite (2015).

10 Many observers considered this target as particularly underambitious, given the projection that developing-country urban populations would be increasing by 2 billion between 2000 and 2020, a large part of which was likely to end up in urban slums under the "business-as-usual" scenario. Also, many thought that by focusing narrowly on slums, target D might have missed an opportunity to frame the problem of slums in the broader context of sustainable urban development (Cohen, 2006).

The world met the target for improved drinking water sources; despite substantial progress, the target for sanitation will only be met after 2015

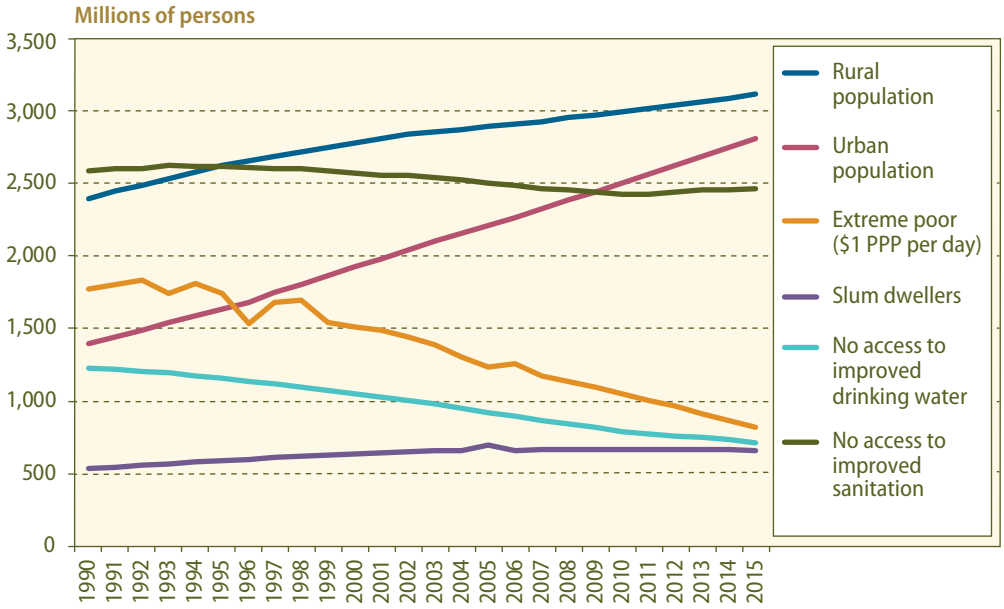
Considerable achievement has been made with regard to both drinking water and sanitation, as noted recently in United Nations (2015a, p. 58-60). Between 1990 and 2015, the proportion of people using an improved drinking water source increased from 76 to 91 per cent, surpassing the MDG target for water, which was met globally in 2010. Sub-Saharan Africa fell short of the target but still achieved a 20 percentage point increase in the use of improved sources of drinking water. The proportion of the global population using an improved sanitation facility went up to 68 per cent in 2015, 14 percentage points more than in 1990—equivalent to 2.1 billion people gaining access. The world as a whole has missed the MDG target for sanitation; however, 95 countries have already met the target, 147 have met the drinking water target and 77 have met both. The rural-urban gap in both areas has also been reduced, although large gaps remain. On the other hand, between 2000 and 2014, more than 320 million people gained access to either an improved water source, improved sanitation, durable housing or less crowded housing conditions, all of which suggests that the target of improving the lives of at least 100 million slum dwellers was largely surpassed. The proportion of the urban population living in slums has fallen significantly in almost all regions; overall, it fell from approximately 39 per cent in 2000 to 30 per cent in 2014.

There are significant urban-rural disparities in access to improved drinking water and sanitation

Policy interventions have contributed to the progress made thus far; however, important challenges remain. It is estimated that, in 2015, 663 million people worldwide (nearly half of which live in sub-Saharan Africa) still use unimproved drinking water sources such as unprotected wells and springs and surface water. Also, 2.4 billion people continue to use unimproved sanitation facilities, including 946 million people who are still practicing open defecation (ibid.). Open defecation raises the risk of contaminating other water sources and can potentially subvert gains in child survival rates and other health-related indicators (United Nations Children's Fund and World Health Organization, 2015). The global and regional statistics also often overstate the achievement in improved drinking water and sanitation. For example, 79 per cent of Nigeria's urban population and 49 per cent of its rural population had improved provision for water in 2012; yet, only 6 per cent of the urban population and 1 per cent of the rural population had water piped on premises.[11] Importantly, the rapid increase in total and urban population in particular has meant that there has been an increase in the absolute number of people not having safe drinking water and hygienic sanitation and living in slums. The slum population in developing countries increased from 550 million to more than 700 million between 1990 and 2015 (figure V.9). Globally, slum population is estimated to be closer to 1 billion and rising (UN-Habitat, 2013) and may soon surpass the number of poor, as measured by the definition of extreme poverty (i.e., living on $1.25 or less per day). Only 17 countries out of the 59 developing countries that regularly reported data on slum dwellers experienced a decline in their slum population.

11 In fact, during 1990-2012, the proportion of urban dwellers with water piped on premises in Nigeria fell from 33 to 6 per cent, and in rural areas the proportion fell from 3 to 1 per cent (Satterthwaite, 2015). Also, despite impressive global gains, most countries are falling short on meeting their own national commitments, with 83 and 70 per cent of countries reportedly falling significantly behind the trends required to meet their defined national access targets for sanitation and drinking water, respectively. See UN-Water (2012).

Figure V.9
Population (rural and urban), poverty, slum dwellers and people without improved drinking water and sanitation, 1990–2015



Source: UN/DESA, based on data from United Nations MDG Database and from the United Nations Population Division.
Note: Data on slum dwellers cover 87 developing countries, with 28 countries having only a single observation. According to higher estimates of UN-Habitat (2013), the number of slum dwellers increased from 650 million in 1990 to 862 million in 2012 and is rising further.

Initiatives for improving access to water and sanitation

Prior to the MDGs, countries that had a stronger tradition of government involvement in development in Northern Africa, Western, Central and East Asia, and Latin America, were already ahead of other developing regions in providing their population with quality access to drinking water (in the form of piped water supply) and basic sanitation (in the form of city-wide sewerage systems) in large urban centres. In 1990, more than 80 per cent of the urban population in these regions, except in East Asia, enjoyed piped water on premises and access to improved sanitation (Satterthwaite, 2015).

Public investment and localization of services have contributed to achieving water and sanitation targets in some countries

Governments in other regions began to intervene in the 2000s, especially as countries framed the water and sanitation challenges within the MDG framework. In Africa, for instance, Rwanda now aims at achieving universal access to drinking water and sanitation by 2017, as laid out in its National Water Supply and Sanitation Policy and Strategic Plan (Rwanda, Ministry of Infrastructure, 2010). The country had already achieved the target for improved sanitation according to indicator 7.9 by 2010/2011 and was expected to be close to reaching the target for improved drinking water sources according to indicator 7.8 in 2015. Progress is attributed to public investment in the sector as well as localization of services, whereby water and sanitation infrastructure has been distributed and managed by Districts (Rwanda, Ministry of Finance and Economic Planning, 2013). Rwanda is also promoting prioritization of basic services ("some for all" rather than "all for some"), decentralization of service provision, participation by communities, cost recovery and financial sustainability, preferential treatment of vulnerable groups, and a strong framework for monitoring results using a management information system. However, so far the more equal allocation of resources has generated most progress in rural areas, with slight negative repercussions for access to drinking water in urban centres (UN-Water, 2014). As seen in

the previous chapter, there are examples of health programmes that have failed to meet their objectives owing to a lack of universal coverage, and a similar problem has been observed for water and sanitation. Ethiopia made significant progress in water and sanitation with its Universal Access Plan, dedicating important financial and human resources with the declared objective of attaining integral coverage by 2020.[12] The country appeared to be on track to meet indicator 7.8 by 2015, with considerable progress occurring in rural areas. There is more limited evidence for indicator 7.9, but there are signs of considerable progress, albeit from a very low base (Ethiopia, Ministry of Finance and Economic Development, 2010).

Some middle-income countries, South Africa for example, have gone one step further by setting ambitious targets for achieving entirely free basic water and sanitation for extremely poor households, allocating public resources for a decentralized service delivery with strong monitoring frameworks. In 2012, 3.47 million and 1.84 million people benefited from free services for water and sanitation, respectively (UN-Water, 2014). However, many poor areas still suffer from lack of access or only have access to non-functional or broken infrastructure, with disproportionate impact on relatively overlooked parts of the population such as women, children and persons with disabilities (South African Human Rights Commission, 2014).[13] On the whole, the country had already met the target for access to improved drinking water sources by 2013 and anticipated that the target for improved sanitation facilities was likely to be met, although this is short of the self-imposed target of 100 per cent access to improved sanitation facilities by 2014. Deficits in sanitation facilities persist in rural areas and it was determined that a key barrier was lack of technical skills in particular municipalities (Republic of South Africa, 2013).

In South-East Asia, Cambodia increased national drinking water coverage by 50 percentage points since 1990 to almost 70 per cent in 2012, with Phnom Penh Water Supply Authority implementing policies to ensure that water is affordable for poor people, especially in urban areas. Cambodia has disaggregated indicators 7.8 and 7.9 into urban and rural targets as part of its adoption process—labelling all goals and targets as Cambodia Millennium Development Goals. The urban targets for improved drinking water sources and improved sanitation facilities, which are considerably higher than the rural indicators (80 per cent coverage for access to improved drinking water sources in urban areas versus 50 per cent for rural areas), had already been met by 2011, but rural targets were lagging behind for both indicators (Cambodia, Ministry of Planning, 2013). In more remote, less populated and poorer rural areas, where more significant investments are needed and less profits expected, the delivery of water and sanitation services remains low (UN-Water, 2014; World Health Organization and United Nations Children's Fund, 2014). This, as seen in previous chapters for social policies, stresses the necessity of providing access to underserved populations that are most difficult to reach.

12 See Moriarty and others (2009); and Ethiopia, Ministry of Water and Energy (2010).

13 It is also a concern that most of South Africa's water is used by business, especially agribusiness, mining, and other industries, at a relatively lower cost per kilolitre than the average cost to poor households (ibid.).

Institutional coordination and decentralization

Collaboration within government has been particularly important for achieving water and sanitation targets…

Adequate collaboration within government has been necessary to ensure the success of policies and programmes in all of the areas covered by the MDGs (see chap. VI); however, it has been particularly needed in expanding access to drinking water and basic sanitation. For example, Uganda has succeeded in improving water service delivery through collaboration between the National Water and Sewerage Corporation, the Ministry of Water and Environment, the Water Policy Committee and other related ministries, such as the Ministry of Finance, Planning and Economic Development and the Ministry of Local Government. The country appeared to be on track to meet the water and sanitation targets of MDG 7 in rural areas, partly through those efforts as well as by taking important steps in combating corruption in the water sector (United Nations Development Programme, 2011; Uganda, Ministry of Finance, Planning and Economic Development, 2013).

…along with adequate policy and legal frameworks, community participation, effective water management, and decentralization

It has also been observed that sustainable provision of water to underserved populations, for example, requires adequate policy and legal frameworks, community participation (see below), and effective water management. These elements necessitate the development of democratic processes and the upgrading of technical skills of people in charge of water provision (Bos, 2006). The case of inter-institutional coordination within Uganda's Government for improving water service delivery was noted above. Likewise, China has markedly increased the proportion of the population using improved drinking water sources and improved sanitation facilities. While this satisfactory outcome has largely been associated with the scaling up of water supply and sanitation as a result of the country's rapid economic growth, other factors have also played an important role, particularly in rural areas. In this respect, Shuchen, Yong and Jiayi (2004) underscore, in the context of China, the importance of well-developed administrative and management arrangements, strong demand from local governments and rural residents, and decentralized and participatory mechanisms to deliver services, among others. These authors also observe that the simultaneous implementation of rural water supply, sanitation and health education for rural residents has called for governments at different levels to organize cross-sectoral collaboration of health bureaus, water resources bureaus, etc., for its implementation.

Decentralization has also proven to be a necessity to address the huge gap in the delivery of water and sanitation services between rural and urban areas and for unlocking MDG progress at local levels (see chap. VI). A cross-country panel regression study for a large number of sub-Saharan countries found that decentralization has a much more positive effect on rural provision of water and sanitation than other factors such as sectoral aid and reducing corruption (Wolf, 2009). In turn, decentralization has been considered one of the most effective mechanisms for addressing problems of corruption which seem to spread relatively easily through the operations, projects and funding of the health and water sectors (see chap. VI).

Community-led initiatives

Community-led initiatives have played a complementary role to public initiatives

Public initiatives by both central and local governments, such as the above, have played the main role in expanding access to safe drinking water and basic sanitation. At the same time, community-led initiatives have also played an important role, which is most of the time complementary to the role of governments. A few such community initiatives are noted as follows.

The Orangi Pilot Project (OPP) in Pakistan demonstrated how inhabitants of a street or lane can band together to finance construction of sewerage pipe in their neighbourhood and then get it connected with the city-wide sewerage system. The local participation helped to keep the construction cost low. It then liaised with the municipal government and official water and sanitation agencies to get the small local pipes connected with big pipes of the cities. By August 2012, 107,090 households in Orangi had connections to sewers through 7,161 collective (lane) initiatives. Outside Orangi, the OPP-Research Training Institute supported similar initiatives in 44 cities and towns and 107 villages covering a population of more than 2 million (Hasan, 2006, 2008, 2010). These types of initiatives and broader policies to expand access have put the country on a trajectory to meet the drinking water target, although there were still some considerable gaps to be covered between urban and rural areas and between particular provinces (Pakistan, Planning Commission, 2013).

The community toilets in Mumbai represent another example of the role of bottom-up action to improve sanitation. The initiative started with a federation of women slum/pavement dwellers constructing community toilets and ensuring, through better management, that the toilets work better. This initiative was later supported and expanded through the alliance of Mahila Milan ("women together"), the National Federation of Slum Dwellers and the local NGO SPARC. Eventually, the municipal government of Mumbai strongly supported the whole process and developed capacity to support the federations in maintenance, repair and response when there were local difficulties. The alliance has built over 600 toilet blocks.

The Baan Mankong programme was set up by the Community Organizations Development Institute (CODI) of Thailand's Government to provide support to community organizations formed by those living in informal settlements. CODI provided a range of loans that allowed these community organizations to design and manage an upgrading programme that also included their members being connected to cities' piped water and sewer system. The community organizations worked together to bring in local governments and move from community initiatives to city-wide initiatives. By 2012, 91,000 households across 270 towns, cities and city districts had been upgraded and, for most of these, tenure for the inhabitants was achieved. This programme must have contributed to the country's considering the drinking water and sanitation targets virtually met by 2009, and its decision to increase efforts towards improvement of living conditions, including slums. These achievements gave the Government more space to turn its attention to issues such as improving the quality of water and the conditions of public toilets to improve their accessibility (Thailand, Office of the National Economic and Social Development Board, 2009).

Synergies and externalities

Efforts to improve access to and quality of water and sanitation have also featured prominently as part of broader development policies and programmes since the 2000s whose scope went beyond the water and sanitation sectors. These policies have, in many instances, triggered important synergies for achieving progress towards a number of other MDGs.

Efforts to improve access to water and sanitation have shown important synergies with other MDGs...

The synergies between MDGs 1 through 4 by way of programme implementation, particularly through the use of conditional cash transfer programmes, were noted in chapters III and IV. The provision of appropriate sanitation facilities at schools, for example,

raises girls' enrolment and ensures that they continue on with their education. The cisterns programme as part of the Fome Zero programme in Brazil has freed women from the duty of fetching water from distant sources and freed up time for education (and other activities). The availability of clean drinking water and sanitation has also been shown to help prevent infections and diarrhoea, thus leading to better nutritional outcomes for a given nutrition supply. Hence, there is evidence that efforts for improving access to drinking water and basic sanitation can simultaneously complement other efforts to achieve multiple development aspirations.

…while also resulting in some positive environmental externalities

At the same time that there have been important synergies, some environmental externalities—from expanding access to drinking water and sanitation—also became prominent after the MDGs were adopted. For example, cities have to rely either on surface or ground water sources to supply drinking water. Cities that rely on surface water bodies need to stay within sustainability limits. The problem is more serious with cities relying on groundwater. Unlike surface water, which is a renewable (as long as excessive extraction does not lead to depletion of the resource), groundwater is not easily renewable, and hence gets depleted soon. For example, in Dhaka, the capital of Bangladesh, dependence on groundwater for water supply has led to lowering of the groundwater table by more than 30 feet, creating the additional danger of subsidence (Hoque, Hoque and Ahmed, 2007).

Reflecting another externality, discharge of untreated urban sewage has become a major source of pollution of rivers and other surface water bodies. A study for Costa Rica, a country that has met the basic sanitation target, has warned that it is imperative for this country to face the negative externalities that are associated with meeting that target, notably the discharge of untreated urban sewage in rivers (Sánchez, 2013). This type of externality can be prevented not only because sewage can be treated before discharging but also because technologies have now become available for converting sewerage into clean drinking water. However, these technologies are costly and developing countries will need both technical and financial help to acquire and use these technologies. The Government of India recently announced the inauguration of a pilot project to treat sewage and supply 66,000 litres of drinking water daily to the surrounding areas in West Delhi, an administrative district of the National Capital Territory of Delhi in India.[14] This provides encouraging evidence that projects to improve access to drinking water and sanitation without damaging the environment may be feasible in developing countries.

Improving the life of slum dwellers

Dealing with root causes is the solution for reducing the number of slum dwellers…

Even if people rise above the $1.25/day poverty line, they can still fail to achieve decent living conditions and be forced to live in slums. For example, despite its huge success in reducing poverty, China registered the highest increase in the number of slum dwellers, from 130 million in 1990 to about 180 million in 2015 (Satterthwaite, 2015). In fact, as noted earlier, despite the success in improving the lives of at least 100 million slum dwellers, a situation is emerging in which the global number of slum dwellers may exceed, in the not so distant future, the total number of people living in extreme poverty (figure V.9).

14 For more details, see press release from the Delhi Jal Board, available from http://www.delhi.gov.in/wps/wcm/connect/5e5bbb00491605e2a793a7114f850e43/PR_09072015.pdf?MOD=AJPERES&lmod=-1749480591.

The root cause of the increase in the number of slum dwellers lies in the overall socioeconomic process, including demographic processes, pattern of economic growth, nature of rural-urban migration, and pattern of urbanization. With 96 per cent of future population growth in developing countries expected to occur in urban areas, prevention of growth of slums proves to be a major challenge (World Bank, 2013e). Overcoming this challenge will require ensuring that economic growth is equitable, with gains reaching the low-income sections of the population so that they can afford to have decent housing and living conditions.

The overall responsibility for reducing the number of slum dwellers and improving the living conditions of the slum dwellers hence lies with national Governments, which have the capacity to influence the pattern of growth and urbanization. According to UN-Habitat estimates, several large developing countries such as Bangladesh, India, and Nigeria have recorded small declines in their slum populations and contributed to the deceleration of the rising global slum population. However, these estimates are very controversial as they do not rely on any official census or sufficiently representative surveys. Paucity and heterogeneity of data across and within countries remains a major challenge for credible assessment (see, e.g., India, Ministry of Housing and Urban Poverty Alleviation, 2010).

Initiatives by communities, non-governmental organizations, and local governments towards improvement of living conditions of slum dwellers, as mentioned above in the context of drinking water and sanitation services, can play only a limited, complementary role. The problems of slums cannot be tackled without addressing the underlying socioeconomic processes that generate the slums.

The lack of understanding of the underlying reasons for the slum problem sometimes has led to superficial, ultimately unsuccessful and even harmful measures. For example, there have been cases of misinterpretation of the UN-Habitat's slogan "Cities without Slums" that suggest forcible eviction of the slum dwellers without proper relocation arrangements. Often forceful evictions were the result of local contestation over prime urban land that could bring high financial returns through commercial development. Powerful social struggles had to be waged to prevent these steps from being implemented or reversed. For example, social struggles in South Africa progressively led authorities to put more emphasis on involving local representative organizations in slum upgrading *in situ* so as to preserve the only housing stock that is affordable to slum dwellers that is in proximity to their employment sources (Huchzermeyer, 2011).

...although intermediate steps such as granting tenure and providing microfinancing can be helpful

Some scholars have suggested certain intermediate steps, such as granting tenure rights to the slum dwellers as a way to strengthen their economic and social position.[15] Such rights could help slum dwellers prevent forced eviction and gain access to various public services. They can also leverage these rights to get credit, increase their earning, and improve their living conditions. Various practicalities however often make granting of tenure rights difficult. Another idea is to promote microfinance, including microcredit that does not require collateral and therefore works even if the slum dwellers do not have ownership rights on their dwellings. In Bangladesh and several other countries, microcredit has indeed expanded among slum dwellers, although stable group formation proves more difficult in slums than in villages, for obvious reasons. Finally, experience from several developing countries shows that increasing the scope for education, health care, training

15 See, for example, De Soto (1989) and De Soto and Cheneval (2006).

and upgrading skills can help to build human capital and break the generational cycle of poverty and slum dwelling (Satterthwaite, 2015).

Lessons and their implications going forward

There were efforts between 2000 and 2015 that resulted in progress towards the achievement of environmental goals, which in many but not all instances were driven by the MDGs. It is important to draw overarching and specific lessons with regard to these efforts, considering that all the SDGs embed the environmental dimension of sustainable development. These lessons are summarized as follows.

Overarching lessons

First, progress made in some environmental areas has not been sustained and it has been difficult to trace the sluggishness of this progress in a timely manner in the absence of time-bound quantitative targets whose monitoring may have prompted policy action. This lesson may be important for the SDGs, many of which have been formulated in qualitative terms. The positive impact of quantitatively specified targets, however, has to be balanced against the problems that may arise when the targets and indicators are chosen inappropriately and are interpreted in a one-size-fits-all fashion. Monitoring of quantitative targets by countries needs to be complemented by qualitative reporting that can inform policy decision makers about the substance of reported quantitative achievement.

Second, policies should be devised to make use of the interconnections among various environmental goals themselves and between environmental goals, on the one hand, and human development goals, on the other. For example, conditional cash transfers can both raise income and provide more access to basic services while facilitating the protection of the environment. Going forward, more emphasis on using these interlinkages will be necessary and it will require finding targets and indicators that can capture these interlinkages in an integrated manner as well as implementing coherent policies to achieve the targets.

Third, the environment has emerged as the quintessential global public good, the protection of which requires global efforts that transcend the traditional developed-developing country divide and the related donor-recipient framework. The emergence of many global funds addressing various global environmental issues since the MDGs were adopted seems to be a clear manifestation of the growing recognition of the necessity of global cooperation on the basis of the principles of solidarity and universality. The necessity of this new type of global cooperation will be more important because the new development agenda is universal.

Fourth, while it is important to have grand global agreements on environmental issues, decentralized actions are equally important. Going forward, the necessity of various regional, national and subnational initiatives will remain acute and the scope and role of multi-stakeholder efforts at both international and national levels for solving environmental problems will increase as the new sustainable development agenda is embraced.

Specific lessons

First, the achievement of MDG 7 with regard to atmospheric issues relied on the UNFCCC, which did not yield the desired results. Much more effort will be necessary to ensure the

success of the UNFCCC process, on which the SDG on climate change will rely for setting CO_2 emission-reduction targets. The international community will have to make sure that the UNFCCC process gives way to necessary cooperation between developed countries and the large, fast-growing developing countries. International agreement needs to be grounded on the Rio CBDR principle, such that climate change mitigation efforts will have to allow growth opportunities as well as financial and technical assistance for countries where (i) vast numbers of people are still deprived of the basic material standard of living and (ii) adaptation is a pressing concern. While it is critical to have an ambitious global agreement on climate change, it is also important to continue all regional, national, subnational, community-level and individual-level efforts towards mitigation and adaptation that proved effective in making progress towards achieving MDG-7 targets.

Second, the importance of forests did not find adequate reflection in the MDGs; but the SDGs have taken note of this lesson and included sustainable management of forests as a goal. Efforts towards protection of forests will have to be combined with efforts towards sustainable production and consumption patterns, in both developed and developing countries. They will also have to acknowledge that deforestation is caused by factors beyond the forest sector's control, necessitating integral approaches, for example between agriculture and forest sectors to address the issue of conversion of forests into agricultural land. In the same vein, the special role of forests in the life and livelihood of people living in poverty and indigenous peoples has to be given adequate attention. The best practices in forest protection and management that have emerged in developed countries, such as under the European Commission's NATURA 2000 initiative, need to be disseminated widely for possible emulation going forward.

Third, the idea of protection of terrestrial and marine areas has been a useful step forward in capturing the interlinkages that exist among various environmental dimensions. Thus, protection of certain land and sea areas can be helpful for simultaneously protecting forests, wetlands, biodiversity, water resources, fish stock and so forth. This in turn is critical for avoiding economic hardships, social tension and conflicts. Addressing the issue of climate change should also be expected to facilitate the protection of terrestrial and marine areas. This calls for the necessity of ensuring that policies are coherent enough (and properly backed up by legislation where necessary) to make the most of the interlinked dimensions of the environment, alone and in conjunction with the social and economic dimensions of development.

Fourth, adequate drinking water and sanitation infrastructure can best be built through public initiatives, complemented by various community and non-governmental initiatives. The infrastructure should be environmentally friendly to avoid the negative externalities that have emerged as countries expanded their access to drinking water and sanitation. For example, in supplying drinking water for urban dwellers, attention has to be paid to the sustainability of the water source. To the extent that the groundwater table is largely non-renewable, the long-term viable option is to rely on surface water bodies, so long as the rate of extraction stays within the sustainability limit. Much more attention has to be given to conservation, reuse and recycling of water. Larger issues of sustainable population and urbanization growth will have to be addressed as well, in order to ensure sustainable access to safe drinking water. The other problematic area, the discharge of untreated sewage into waterbodies, should also be adequately addressed. Technologies that can convert sewage into clean potable water should be made affordable and promoted widely.

Fifth, a shallow, superficial view of the slums problem and the corresponding mechanical, unsustainable, and often cruel solutions (such as forceful eviction of slum dwellers, in the name of beautification of cities, and without making any alternative arrangement for their housing and livelihood) must be avoided going forward. Instead, the basic socioeconomic processes in which the slum problem is rooted need to be changed. The solution to the slum problem has to be sought in sustained, inclusive and equitable economic growth, driven by sustainable patterns of production and consumption, sustainable urbanization, and human development. Some intermediate steps towards improvement of the lives of slum dwellers will need to be taken in the meantime, including granting of tenure rights, provision of microfinancing services, increasing access to public services related to health and education, and providing social protection.