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WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL

Global Water Supply and Sanitation Assessment 2000 Report

The WHO and UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) provides a snapshot of water supply and sanitation worldwide at the turn of the millennium using information available from different sources. From 2001 the JMP database – for both historic data and future projections – will be periodically updated. All assistance in identifying unused and new data to improve the estimates presented here is welcome.

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GLOBAL WATER SUPPLY AND SANITATION ASSESSMENT 2000 REPORT

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Foreword by the Director-General of WHO and the Executive Director of UNICEF

Half a century of efforts by WHO, UNICEF and other international organizations to improve water and sanitation conditions around the world have contributed to global awareness, the establishment of international programmes and the strengthening of national institutions. In the 1990s this afforded improved water supply for more than 800 million people and sanitation for around 750 million people. However, despite the intensive efforts of many institutions at the national and international levels, nearly 1.1 billion people still remain without access to improved sources of water, and about 2.4 billion have no access to any form of improved sanitation services. As a consequence, 2.2 million people in developing countries, most of them children, die every year from diseases associated with lack of safe drinking-water, inadequate sanitation and poor hygiene.

Access to safe water and to sanitary means of excreta disposal are universal needs and, indeed, basic human rights. They are essential elements of human development and poverty alleviation and constitute an indispensable component of primary health care. There is evidence that provision of adequate sanitation services, safe water supply, and hygiene education represents an effective health intervention that reduces the mortality caused by diarrhoeal disease by an average of 65% and the related morbidity by 26%. Inadequate sanitation, hygiene and water result not only in more sickness and death, but also in higher health costs, lower worker productivity, lower school enrollment and retention rates of girls and, perhaps most importantly, the denial of the rights of all people to live in dignity.

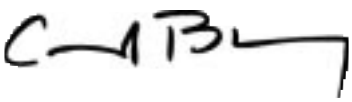
The International Drinking Water Supply and Sanitation Decade (1981–1990) was a period of accelerated and concerted effort to expand water supply and sanitation services to the unserved and underserved poor populations. At the World Summit for Children in 1990, the goal of universal access to safe water and sanitation by the year 2000 was adopted to promote the survival, protection and development of children. The importance of universal access to drinking-water supply and sanitation was further reiterated at the 1992 United Nations Conference on Environment and Development (UNCED). Thereafter, many other crucial international conferences recognized water and sanitation as the bedrock of public health and social progress and the key to improving children's survival, health and development.

Since 1990, WHO and UNICEF have been collaborating in the Joint Monitoring Programme, which has as its main purposes the building of national capacity for the water and sanitation sector, monitoring and informing policy-makers globally on the status of the sector. This programme reaffirms the commitments made by UNICEF and WHO to work together towards universal access to safe drinking-water and sanitation. More specifically, the global assessment of the water supply and sanitation sector described in this report represents an important joint contribution of the two organizations towards this goal.

Diseases related to contaminated drinking-water, unsanitary food preparation, inadequate excreta disposal and unclean household environments constitute a major burden on the health of peoples in the developing world and are among the leading causes of ill-health. Sustainable health, especially for children, is not possible without effective and adequate water supply and environmental sanitation.

We hope that the findings of this important assessment report will serve its major purpose of attracting the attention of policy-makers and decision-makers in governments, bilateral and multilateral agencies, nongovernmental organizations and civil society in general, to the crucial need to intensify efforts to attain the target of Vision 21: universal coverage with safe water supply and adequate sanitation by the year 2025. That this vision will bear fruit for the health of people in need is the aim and commitment of both our organizations.

Gro Harlem Brundtland
Director-General, World Health Organization (WHO)



Carol Bellamy
Executive Director, United Nations Children's Fund (UNICEF)

Foreword by the Chairperson of the Water Supply and Sanitation Collaborative Council

This document is an important benchmark for international efforts to bring dignity and health to the world's most deprived people. Through the commendable efforts of WHO and UNICEF we now have a sound basis on which to plan, implement and monitor improvements in water supply and sanitation in the coming years.

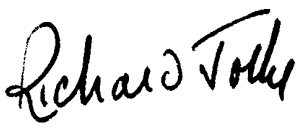
That such improvements are urgently needed was never in doubt. For many years, governments and international agencies have been shamed by the plight of nearly half the world's population – those who live their lives with no hygienic means of personal sanitation. The 1980s, the International Drinking Water Supply and Sanitation Decade, saw big strides made in finding affordable technologies and participatory approaches to help serve those without access to improved water and sanitation services. But that Decade also demonstrated conclusively that "business as usual" would never bring improvements quickly enough to cope with the backlog and provide access to growing populations. Then, too, UNICEF and WHO brought us the damning statistics to prove it.

In the year 2000, we start with a new perspective. In Vision 21, the Water Supply and Sanitation Collaborative Council (WSSCC) has presented a strong consensus that concerted action supporting people's own energy and initiatives can bring rapid and lasting improvements. Targets will vary from country to country, but Vision 21 envisages that the number of people without access to improved water and sanitation services will be halved by 2015, and universal coverage will be achieved by 2025. To reach these goals, we need continuous advocacy targeted at all the stakeholders. The most powerful advocacy tool is dependable information. The big improvements in data gathering that WHO and UNICEF have introduced with this latest global assessment provide us with the baseline and the monitoring methodology that will ensure reliable and consistent statistics to report our progress with confidence. By focusing on users, rather than providers, as primary sources of data the document gains in credibility and creates just the platform we need for tracking the local initiatives that are at the heart of Vision 21.

I am especially pleased at the innovative use of the Internet to keep the statistics updated and accessible on a day-to-day basis. As of today, all those interested in the sector have access, not just to the analyses made by UNICEF and WHO, but to the complete data on which those analyses are based. It is a huge step forward and one that will pay big dividends as Internet usage spreads across the developing world.

In the coming years, WSSCC will work with WHO and UNICEF to extend the monitoring process. We will look for new indicators, to assess the spread of Vision 21 approaches, to assess the impact on the delivery of basic services to the poor, and to assess the social and economic benefits of improved water and sanitation. In commending WHO and UNICEF for their excellent work to date, I call also on all the Collaborative Council's partners to join in the efforts to extend and improve the data by contributing from their own programmes.

With Global Assessment 2000 we have our starting point defined and our monitors in place. Let's be sure through our combined efforts that the next global assessment in three years' time shows good progress towards our ambitious, but eminently achievable goals.



Richard Jolly,
Chairperson, Water Supply and Sanitation Collaborative Council

Preface

At the end of the International Drinking Water Supply and Sanitation Decade, WHO and UNICEF decided to combine their experience and resources in a Joint Monitoring Programme for Water Supply and Sanitation. At its inception, the overall aim of the Joint Monitoring Programme was to improve planning and management within countries by supporting countries in monitoring the water and sanitation sector. This concept evolved and the JMP included within its aims the recurrent preparation of global assessments of the water supply and sanitation sector.

This report presents the findings of the fourth assessment by the WHO and UNICEF Joint Monitoring Programme. Previous reports were produced in 1991, 1993 and 1996 and were devoted primarily to providing information on water supply and sanitation coverage, and on the progress made at the country level by local agencies in monitoring the sector.

The present report updates and consolidates findings of earlier reports through the use of broader and verifiable data sources. Such sources include information from national surveys, which provided the basis for determining most of the coverage figures in this report. Important resources were mobilized throughout the world for data collection and data analysis. Many countries formed national teams representing the different sector agencies, not only to collect data, but also to assess the status of their water supply and sanitation sector. In Latin America and the Caribbean most countries, under the leadership of the WHO Regional Office for the Americas, prepared country assessment reports as a result of the debates and findings of their country-level exercises.

There are serious limitations to the monitoring of water supply and sanitation in many developing countries; while for the purposes of international assessment it is necessary to pursue international consistency. Most of this report coverage has been calculated from service user information, rather than service provider information. Although this may generate coverage estimates that may differ from official country statistics, this approach provides the best overall assessment based on the data available. As new information becomes available this will systematically be added to the information base and estimates will be updated accordingly through the WHO and UNICEF web sites.

This report constitutes a source of information for water and sanitation coverage estimates, and for supporting decisions relating to investment, planning, management and quality of service in the sector. It aims to inform those within and beyond the water supply and sanitation sector of the current status of water supply and sanitation, and to highlight the huge challenges faced in meeting the need for safe water supply and adequate sanitation world wide. It is written for all those who wish to know where the water and sanitation sector now stands, and how it is changing over time. These include: national government officials; sector planners and consultants; bilateral, multilateral and United Nations agency staff; staff of international and national professional associations and nongovernmental organizations; researchers; and sector professionals throughout the world. The water supply and sanitation coverage data generated by the Joint Monitoring Programme are the reference data for the United Nations system. As such, they will be used as the water supply and sanitation reference for the United Nations' World Water Resources report, which will be launched in 2002 on the tenth anniversary of the Earth Summit.

1. The Global Water Supply and Sanitation Assessment 2000

This chapter presents the main findings of the Global Water Supply and Sanitation Assessment 2000. It also outlines the background, methodology and limitations of the Assessment.

Access to water supply and sanitation is a fundamental need and a human right. It is vital for the dignity and health of all people.

The health and economic benefits of water supply and sanitation to households and individuals (and especially to children) are well documented. Of special importance to the poor are the time-saving, convenience and dignity that improved water supply and sanitation represent. Those without access are the poorest and least powerful. Access for the poor is a key factor in improving health and economic productivity and is therefore an essential component of any effort to alleviate poverty.

1.1 Main findings

The percentage of people served with some form of improved water supply rose from 79% (4.1 billion) in 1990 to 82% (4.9 billion) in 2000. Over the same period the proportion of the world's population with access to excreta disposal facilities increased from 55% (2.9 billion people served) to 60% (3.6 billion). At the beginning of 2000 one-sixth (1.1 billion people) of the world's population was without access to improved water supply (Figure 2.1) and two-fifths (2.4 billion people) lacked access to improved sanitation (Figure 2.2). The majority of these people live in Asia and Africa, where fewer than one-half of all Asians have access to improved sanitation and two out of five Africans lack improved water supply. Moreover, rural services still lag far behind urban services. Sanitation coverage in rural areas, for example, is less than half that in urban settings, even though 80% of those lacking adequate sanitation (2 billion people) live in rural areas – some 1.3 billion in China and India alone. These figures are all the more shocking because they reflect the results of at least twenty years of concerted effort and publicity to improve coverage.

One positive finding of the Assessment 2000 is that sanitation coverage appears to be higher than would be expected from the findings of earlier assessments. This is because the consumer-based survey data in the Assessment 2000 account for households that provided their own sanitation facilities, especially in Asia and Africa. These facilities were not covered by the provider-based data used in previous assessments.

Although an enormous number of additional people gained access to services between 1990 and 2000, with approximately 816 million additional people gaining access to water supplies and 747 million additional people gaining access to sanitation facilities, the percentage increases in coverage appear modest because of global population growth during that time. Unlike urban and rural sanitation and rural water supply, for which the percentage coverage has increased, the percentage coverage for urban water supply appears to have decreased over the 1990s. Furthermore, the numbers of people who lack access to water supply and sanitation services remained practically the same throughout the decade.

The water supply and sanitation sector will face enormous challenges over the coming decades. The urban populations of Africa, Asia, and Latin America and the Caribbean are expected to increase dramatically. The African urban population is expected to more than double over the next 25 years, while that of Asia will almost double. The urban population of Latin America and the Caribbean is expected to increase by almost 50% over the same period.

Although the greatest increase in population will be in urban areas, the worst levels of coverage at present are in rural areas. In Africa, Asia, and Latin America and the Caribbean, rural coverage for sanitation is less than one-half that of urban areas. In those three regions alone, just under 2 billion people in rural areas are without access to improved sanitation, and just under 1 billion are without access to improved water supply.

This report uses international development targets to highlight the challenges faced by the sector in reducing the coverage gap (see Box 1.1).

To achieve the 2015 target in Africa, Asia and Latin America and the Caribbean alone, an additional 2.2 billion people will need access to sanitation and 1.5 billion will need access to water supply by that date. In effect, this means providing water supply services to 280 000 people and sanitation facilities to 384 000 people every day for the next 15 years.

Projected urban population growth, especially in Africa and Asia, suggests that urban services will face great challenges over the coming decades to meet fast-growing needs. At the same time, rural areas also face the daunting task of meeting the existing large service gap. To reach universal coverage by the year 2025, almost 3 billion people will need to be served with water supply and more than 4 billion with sanitation.

Poor water supply and sanitation have a high health toll (Boxes 1.2 and 1.3), whereas improving water and sanitation brings valuable benefits to both social and economic development (Box 1.4). The simple act of washing hands with soap and water can reduce diarrhoeal disease transmission by one-third. Hygiene promotion, therefore, is an important priority.

BOX 1.1 INTERNATIONAL DEVELOPMENT TARGETS FOR WATER SUPPLY AND SANITATION COVERAGE

Indicative targets for water supply and sanitation coverage were developed by the Water Supply and Sanitation Collaborative Council (WSSCC) as part of the process leading up to the Second World Water Forum, The Hague, 17–22 March 2000. The targets were presented in the report *VISION 21: A shared vision for hygiene, sanitation and water supply and a framework for action (1)*. The targets to be achieved are:

- **By 2015 to reduce by one-half the proportion of people without access to hygienic sanitation facilities, which was endorsed by the Second World Water Forum, The Hague, March 2000.**
- **By 2015 to reduce by one-half the proportion of people without sustainable access to adequate quantities of affordable and safe water, which was endorsed by the Second World Water Forum and in the United Nations Millennium Declaration.**
- **By 2025 to provide water, sanitation, and hygiene for all.**

The VISION 21 report stresses the indicative nature of these targets and the need to consider them in local context. Such targets are nevertheless helpful in assessing the magnitude of the task ahead in meeting the water and sanitation needs of the poor. These targets build upon the target of universal coverage established for the International Drinking Water Supply and Sanitation Decade 1981–1990, which was readopted as the target for the year 2000 at the World Summit for Children in 1990.

Coverage targets themselves have been criticized as failing to focus on the changes that contribute progressively to health and development and as being too simplistic, dividing the world into those who "have" and those who "have not." The Assessment 2000 report represents a first step in moving towards a breakdown according to means of provision, in addition to overall coverage estimation.

BOX 1.2 HEALTH HAZARDS OF POOR WATER SUPPLY AND SANITATION

- **Approximately 4 billion cases of diarrhoea each year** *(2)* **cause 2.2 million deaths,** mostly among children under the age of five *(3)*. This is equivalent to one child dying every 15 seconds, or 20 jumbo jets crashing every day. These deaths represent approximately 15% of all child deaths under the age of five in developing countries. Water, sanitation, and hygiene interventions reduce diarrhoeal disease on average by between one-quarter and one-third *(4)*.
- **Intestinal worms infect about 10% of the population of the developing world** *(2)*. These can be controlled through better sanitation, hygiene and water supply *(5)*. Intestinal parasitic infections can lead to malnutrition, anaemia and retarded growth, depending upon the severity of the infection.
- **It is estimated that 6 million people are blind from trachoma** and the population at risk from this disease is approximately 500 million. Considering the more rigorous epidemiological studies linking water to trachoma, Esrey et al. *(4)* found that providing adequate quantities of water reduced the median infection rate by 25%.
- **200 million people in the world are infected with schistosomiasis,** of whom 20 million suffer severe consequences. The disease is still found in 74 countries of the world. Esrey et al. *(4)*, in reviewing epidemiological studies, found a median 77% reduction from well-designed water and sanitation interventions.
- **Arsenic in drinking water is a major public health threat.** According to data from about 25 000 tests on wells in Bangladesh, 20% have high levels of arsenic (above 0.05 mg/l). These wells were not, however, selected at random and may not reflect the true percentage *(6)*. Many people are working hard in Bangladesh, West Bengal and other affected areas to understand the problem and identify the solution.

BOX 1.3 CHOLERA EPIDEMICS

Cholera is a worldwide problem that can be prevented by ensuring that everyone has access to safe drinking-water, adequate excreta disposal systems and good hygiene behaviours.

Major health risks arise where there are large concentrations of people and hygiene is poor. These conditions often occur in refugee camps, and special vigilance is needed to avoid outbreaks of disease.

Most of the 58 057 cases of cholera reported in Zaire in 1994 occurred in refugee camps near the Rwandan border. A decrease to 553 cases in Zaire in 1995 reflected the stabilization of refugee movement.

A cholera epidemic that began in Peru in 1990 spread to 16 other countries in Latin America. A total of 378 488 cases were reported in Latin America in 1991. Ten years later, cholera remains endemic following its absence from the continent for nearly a century

Source: *(7)*

BOX 1.4 HEALTH BENEFITS OF IMPROVED WATER SUPPLY AND SANITATION

Water supply and health

Lack of improved domestic water supply leads to disease through two principal transmission routes *(8):*

- **Waterborne disease transmission occurs by drinking contaminated water.** This has taken place in many dramatic outbreaks of faecal–oral diseases such as cholera and typhoid. Outbreaks of waterborne disease continue to occur across the developed and developing world. Evidence suggests that waterborne disease contributes to background rates of disease not detected as outbreaks. The waterborne diseases include those transmitted by the faecal–oral route (including diarrhoea, typhoid, viral hepatitis A, cholera, dysentery) and dracunculiasis. International efforts focus on the permanent eradication of dracunculiasis (guinea worm disease).
- **Water-washed disease occurs when there is a lack of sufficient quantities of water for washing and personal hygiene.** When there is not enough water, people cannot keep their hands, bodies and domestic environments clean and hygienic. Without enough water, skin and eye infections (including trachoma) are easily spread, as are the faecal–oral diseases.
- **Diarrhoea is the most important public health problem affected by water and sanitation and can be both waterborne and water-washed.**

Adequate quantities of safe water for consumption and its use to promote hygiene are complementary measures for protecting health. The quantity of water people use depends upon their ease of access to it. If water is available through a house or yard connection people will use large quantities for hygiene, but consumption drops significantly when water must be carried for more than a few minutes from a source to the household *(9).*

Sanitation and health

Sanitation facilities interrupt the transmission of much faecal–oral disease at its most important source by preventing human faecal contamination of water and soil. Epidemiological evidence suggests that sanitation is at least as effective in preventing disease as improved water supply. Often, however, it involves major behavioural changes and significant household cost. Sanitation is likely to be particularly effective in controlling worm infections. Adults often think of sanitation in adult terms, but the safe disposal of children's faeces is of critical importance. Children are the main victims of diarrhoea and other faecal–oral disease, and also the most likely source of infection. Child-friendly toilets, and the development of effective school sanitation programmes, are important and popular strategies for promoting the demand for sanitation facilities and enhancing their impact.

Adequate quantities of safe water and good sanitation facilities are necessary conditions for healthy living, but their impact will depend upon how they are used. Three key hygiene behaviours are of greatest likely benefit:

- Hand washing with soap (or ash or other aid).
- Safe disposal of children's faeces.
- Safe water handling and storage.

1.2 Background and methods

The Assessment 2000, carried out through the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP), differs from the previous JMP exercises in three important ways:

- **The Assessment 2000 covers the whole world through presentation of data from six regions: Africa, Asia, Europe, Latin America and the Caribbean, Northern America and Oceania as defined by the United Nations, Department of Economic and Social Affairs, Population Division *(10)*. Previous assessments were limited to the developing countries.**
- **Household survey data have been used extensively to estimate coverage figures.**
- **The report provides a more comprehensive overview of the sector by presenting a broader range of information than simply coverage.**

The change in methodology between this and earlier assessments makes it difficult to compare the present results with those obtained in previous years. To assess trends, coverage estimates were largely based on survey data, and were made only for those countries where such data were reasonably consistent, and were available over a sufficient period of time for a trend to be discerned. Fortunately, the countries for which this was the case included well over two-thirds of the total population, enabling meaningful statements to be made about global and regional trends over the 1990s. Where survey data were not available, the estimates provided through the questionnaire for the Assessment 2000 were used.

A detailed explanation of the methods used for the collection and analysis of coverage data is given in Annex A.

In the past, the monitoring of the population with access to adequate water supply and sanitation facilities has proved problematic because the level of detail of such data as estimated by service providers is often limited. The Assessment 2000 instead turned also to consumer-based information in the form of household survey data. This has allowed for a far more detailed picture of the water and sanitation technologies being used. It also captures information related to usage and breakdown of self-built facilities, of which service providers may be unaware.

Data collection for the Assessment 2000 had two main sources: questionnaires and household surveys. Electronic files were compiled that presented the information from both sources and are accessible through the WHO and UNICEF web sites. The web sites will be regularly updated on the basis of reports received.

The definition of coverage used in the Assessment 2000 and in this report is based on technology type. In past assessments, the coverage figures referred to "safe" water supply and "adequate" sanitation. One of the findings of the current assessment is that there is a lack of information on the safety of the water served to the population and on the adequacy of sanitation facilities. Population-based surveys do not provide specific information on the quality of the drinking-water, or precise information on the adequacy of sanitation facilities. Therefore, this assessment assumed that certain types of technology are safer or more adequate than others and that some of them could not be considered as "coverage." The terms "safe" and "adequate" were replaced with "improved" to accommodate these limitations. The population with access to "improved" water supply and sanitation is considered to be covered. Types of facilities that are considered as improved water sources and improved sanitation facilities are given in Box 1.5. Essentially, technology is used as an indicator of improved water and sanitation. Like all indicators, it can allow only an approximate description of water and sanitation coverage. The coverage figures produced by technology indicators do not provide information about the quality of the water provided or about its use. Furthermore, factors such as intermittence or disinfection could not be taken into account in the coverage figures.

BOX 1.5 WATER SUPPLY AND SANITATION TECHNOLOGIES CONSIDERED TO BE "IMPROVED" AND THOSE CONSIDERED TO BE "NOT IMPROVED"

The following technologies were considered "improved":

Water supply	**Sanitation**
Household connection	Connection to a public sewer
Public standpipe	Connection to septic system
Borehole	Pour-flush latrine
Protected dug well	Simple pit latrine
Protected spring	Ventilated improved pit latrine
Rainwater collection	

The following technologies were considered "not improved":

Water supply	**Sanitation**
Unprotected well	Service or bucket latrines (where excreta are manually removed)
Unprotected spring	Public latrines
Vendor-provided water	Open latrine
Bottled water[1]	
Tanker truck provision of water	

[1] *Not considered "improved' because of limitations concerning the potential quantity of supplied water, not the quality.*

Particular care was taken in reviewing the coverage data for the 40 largest developing countries. These countries include 90% of the population of the developing world and as such have a significant effect on regional and global aggregate figures. Detailed information on household connections in developing countries will be presented in the JMP Databook 2000.

Estimates of percentage coverage for a region are based upon country estimates of the absolute numbers of people with and without access to water supply and sanitation. The data were obtained from available household surveys, or from country questionnaires. If country estimates were not available, regional estimates were obtained by extrapolating from countries within the region for which estimates existed. Such extrapolation, however, is used only to compute regional and global statistics. The data for individual countries, areas or territories are drawn from relevant sources.

In addition to collecting coverage data, the questionnaire sought information on other aspects of the sector, including finance and costs, target setting, sector constraints, factors affecting quality of service and information about the largest city in each country. This information will be presented in full, by country, area or territory, in the JMP Databook 2000.

1.3 Limitations of the Assessment 2000

As noted above, access to improved water and sanitation is estimated using technology as an indicator. Definitions of "improved" technologies are thus based on assumptions that certain technologies are better for health than others. These assumptions may not be true in all individual cases. For instance, in some locations an unprotected household well may provide a better supply of water, both in terms of quantity and quality of water, than a household connection which may be subject to intermittence and poor water quality.

In some cases, it is also likely that water supplies from vendors or tanker trucks, or sanitation services by public toilets, may be adequate. However, from a public health perspective, experience suggests that such technologies are typically inferior to "improved" services. The quantities of water distributed through this alternative are likely to be less than 20 litres of water per capita per day.

While household surveys provide the most accurate available data, they suffer from other problems. Definitions of services vary not only between the different types of surveys undertaken, but also over time. It is therefore sometimes difficult to compare surveys undertaken even within the same country. In particular, the Assessment 2000 did not provide standardized definitions of urban and rural, as none could be found that would be consistent with the range of definitions adopted locally. Accordingly, the national classification of urban and rural was accepted.

In many countries, there have been a large number of population-based surveys over the past 10–15 years. In others, except for censuses, such surveys have not been conducted at all. Much uncertainty about coverage remains in many countries, and there is a need to refine and develop the monitoring process. The monitoring of access to water supply and sanitation is generally weak at national level and is likely to be even weaker at local level. Reliable coverage figures for individual countries, regions, cities and districts would contribute significantly to national planning and deployment of resources, through bilateral and multilateral cooperation.

Although most well-designed household surveys provide breakdowns of national data at subnational level (provinces, districts, etc.), this report has used nationally consolidated data for its regional and global sector analysis. Using national consolidated data can often hide important variations within a country. For example, national consolidated data cannot describe disparities between and within urban areas. There is also a danger that national consolidated data do not represent the conditions of the poorest of the poor, who are often hidden in totals or averages.

The present report refers mainly to water supply and sanitation coverage, as that was the remit of the Assessment 2000. But hygiene is also vitally important to health, and the collection and use of hygiene information will be an important component of future work.

These coverage figures represent only those countries, areas and territories reporting in the Assessment 2000 and those for which household survey data were available. Some regions have higher representation than others within the Assessment 2000. The exercise aimed to employ standardized definitions in all countries; inevitably, however, the definitions are not entirely standardized. Some countries used more stringent definitions of improved water supply and sanitation than others.

2. Global status

This chapter presents global and regional coverage status for water supply and sanitation in 1990 and 2000, based on information from household survey data and questionnaires. It provides an overview of the change in water supply and sanitation coverage over time.

During the period 1990–2000 it is estimated that the global population increased by 15% (from 5.27 to 6.06 billion). Within that total figure, the global urban population increased by one-quarter, while the rural population increased by less than 8%.

The population growth of the 1990s has meant that an estimated 620 million additional people gained access to water supply by 2000, and 435 million additional people gained access to sanitation facilities, just to maintain the percentage coverage at constant levels. Extraordinary work was done in the sector to serve an ever-increasing population. With a total population increase of 789 million people over the past decade, the sector was able to provide improved water supply to an additional 816 million people (224 000 people a day for 10 years), and improved sanitation to an additional 747 million people (205 000 people a day). Some inroads have therefore been made into the backlog of people needing improved services. However, despite all the efforts made and the results achieved, there remains a backlog of 1.1 billion people without access to improved water supply and 2.4 billion without access to any sort of improved sanitation facility.

The 1990s saw a shift in the urban/rural balance with an increasing proportion of the world's population living in urban areas. In 2000, 47% of the world's population were urban dwellers, as opposed to 43.5% in 1990. This trend towards urbanization is set to continue and most urban population growth is predicted to take place in Africa, Asia, and Latin America and the Caribbean. The population data used here and throughout the report, including the projections presented, are those of the United Nations Department of Economic and Social Affairs, Population Division. The populations of the regions are presented in Table 2.1.

As can be seen from Table 2.1, population growth in Africa is almost double the global average. The combination of fast population growth with accelerated urbanization, and low levels of water supply and sanitation coverage make Africa especially vulnerable to the risk of water-related disease.

TABLE 2.1 WORLD POPULATION BY REGION (IN MILLIONS) [1]

	Africa	Asia	LA & C	Oceania	Europe	N. Amer.	Global
1990	615	3 180	441	26	722	282	5 266
2000	784	3 683	519	30	729	310	6 055
% Increase	27.5	15.8	17.7	15.4	1.0	9.9	15.0

[1] Source: *(10)*.

2.1 Global coverage

Table 2.2 shows the numbers of people with and without access to improved water supply and sanitation, both globally and by region, together with percentage coverage. The corresponding information for urban and rural areas is also given. Estimates are provided for both 1990 and 2000. The percentage of the population on which the estimates for each region are based is shown in italics above each section, and reflects the availability of data. Overall, data were available for 76% of the global population for 1990, while 89% were represented in the 2000 figures.

One of the aims of Assessment 2000 was to improve the quality of water supply and sanitation coverage data. However, when comparing estimates, and especially when interpreting trends over time, it should be recognized that more data were available for a greater number of countries for the year 2000 than for 1990.

Globally, 1.1 billion people are without access to improved water supply and 2.4 billion are without access to improved sanitation. Figures 2.1 and 2.2 show where the unserved population is found. For both water supply and sanitation, the vast majority of those without access are in Asia.

Figure 2.1 Distribution of the global population not served with improved water supply, by region

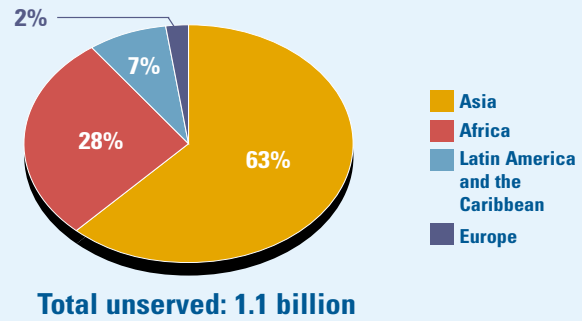


Figure 2.2 Distribution of the global population not served with improved sanitation, by region

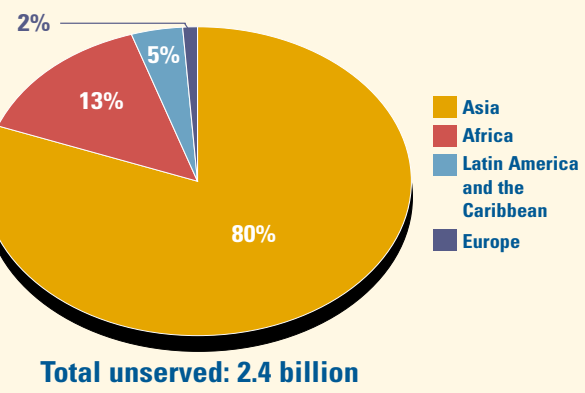


TABLE 2.2 WATER SUPPLY AND SANITATION COVERAGE BY REGION, 1990 AND 2000[1]

Region	1990 Population (millions)				2000 Population (millions)			
	Total population	Population served	Population unserved	% Served [2]	Total population	Population served	Population unserved	% Served [2]
GLOBAL	*(76% of regional population represented)*				*(89% of regional population represented)*			
Urban water supply	2 292	2 179	113	**95**	2 845	2 672	173	**94**
Rural water supply	2 974	1 961	1 013	**66**	3 210	2 284	926	**71**
Total water supply	5 266	4 140	1 126	**79**	6 055	4 956	1 099	**82**
Urban sanitation	2 292	1 877	415	**82**	2 845	2 442	403	**86**
Rural sanitation	2 974	1 028	1 946	**35**	3 210	1 210	2 000	**38**
Total sanitation	5 266	2 905	2 361	**55**	6 055	3 652	2 403	**60**
AFRICA	*(72% of regional population represented)*				*(96% of regional population represented)*			
Urban water supply	197	166	31	**84**	297	253	44	**85**
Rural water supply	418	183	235	**44**	487	231	256	**47**
Total water supply	615	349	266	**57**	784	484	300	**62**
Urban sanitation	197	167	30	**85**	297	251	46	**84**
Rural sanitation	418	206	212	**49**	487	220	267	**45**
Total sanitation	615	373	242	**61**	784	471	313	**60**
ASIA	*(88% of regional population represented)*				*(94% of regional population represented)*			
Urban water supply	1 029	972	57	**94**	1 352	1 254	98	**93**
Rural water supply	2 151	1 433	718	**67**	2 331	1 736	595	**75**
Total water supply	3 180	2 405	775	**76**	3 683	2 990	693	**81**
Urban sanitation	1 029	690	339	**67**	1 352	1 055	297	**78**
Rural sanitation	2 151	496	1 655	**23**	2 331	712	1 619	**31**
Total sanitation	3 180	1 186	1 994	**37**	3 683	1 767	1 916	**48**
LATIN AMERICAN AND THE CARIBBEAN	*(77% of regional population represented)*				*(99% of regional population represented)*			
Urban water supply	313	287	26	**92**	391	362	29	**93**
Rural water supply	128	72	56	**56**	128	79	49	**62**
Total water supply	441	359	82	**82**	519	441	78	**85**
Urban sanitation	313	267	46	**85**	391	340	51	**87**
Rural sanitation	128	50	78	**39**	128	62	66	**49**
Total sanitation	441	317	124	**72**	519	402	117	**78**
OCEANIA	*(64% of regional population represented)*				*(85% of regional population represented)*			
Urban water supply	18	18	0	**100**	21	21	0	**98**
Rural water supply	8	5	3	**62**	9	6	3	**63**
Total water supply	26	23	3	**88**	30	27	3	**88**
Urban sanitation	18	18	0	**99**	21	21	0	**99**
Rural sanitation	8	7	1	**89**	9	7	2	**81**
Total sanitation	26	25	1	**96**	30	28	2	**93**
EUROPE	*(15% of regional population represented)*				*(44% of regional population represented)*			
Urban water supply	522	522	0	**100**	545	542	3	**100**
Rural water supply	200	199	1	**100**	184	161	23	**87**
Total water supply	722	721	1	**100**	729	703	26	**96**
Urban sanitation	522	522	0	**100**	545	537	8	**99**
Rural sanitation	200	199	1	**100**	184	137	47	**74**
Total sanitation	722	721	1	**100**	729	674	55	**92**
NORTHERN AMERICA	*(99.9% of regional population represented)*				*(99.9% of regional population represented)*			
Urban water supply	213	213	0	**100**	239	239	0	**100**
Rural water supply	69	69	0	**100**	71	71	0	**100**
Total water supply	282	282	0	**100**	310	310	0	**100**
Urban sanitation	213	213	0	**100**	239	239	0	**100**
Rural sanitation	69	69	0	**100**	71	71	0	**100**
Total sanitation	282	282	0	**100**	310	310	0	**100**

[1] Source: *(10)*.

[2] Due to rounding, coverage figures might not total 100% even if the population unserved is shown as 0.

2.2 Changes during the 1990s

Figures 2.3 and 2.4 show the changes between 1990 and 2000 in the global percentage coverage for improved water supply and sanitation, respectively. They suggest that coverage has increased over the past ten years for all but urban water supply, where percentage coverage has decreased. An enormous number of people have gained access to improved facilities over that time: about 816 million people have gained access to improved water supply and 747 million people have gained access to improved sanitation.

Despite this enormous increase in the absolute numbers of people with access to improved facilities, the apparent change in coverage between 1990–2000 is not especially large in percentage terms. Overall, the increase in the numbers of people served was just sufficient to keep pace with population growth. Population growth is likely to continue over the coming decades, creating increasing pressure on services that are already overwhelmed, especially in urban areas and in Africa.

Most of the developing countries are concentrated in Africa, Asia, and Latin America and the Caribbean. For this reason, Figures 2.5 and 2.6 were prepared aggregating these three regions. As expected, the variations are similar to those of global coverage due to the fact that little percentage variation occurred over the 1990s in Europe, Northern America and Oceania.

Figure 2.3 Global water supply coverage

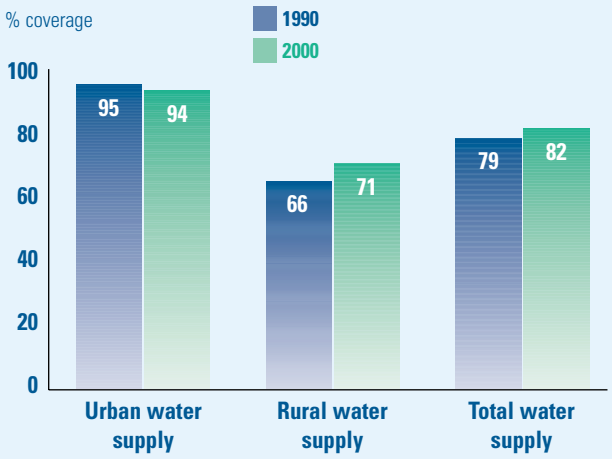


Figure 2.4 Global sanitation coverage

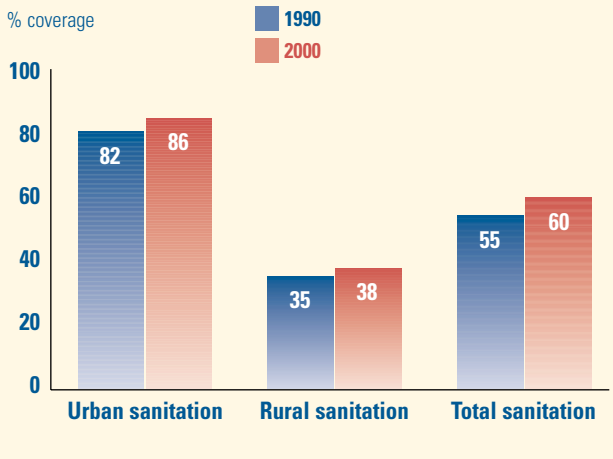


Figure 2.5 Total water supply coverage for Africa, Asia, and Latin America and the Caribbean

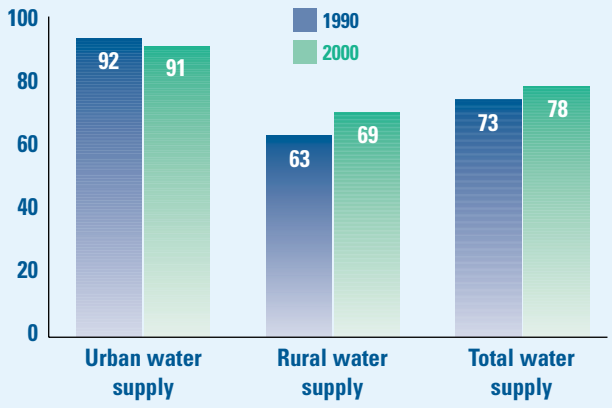
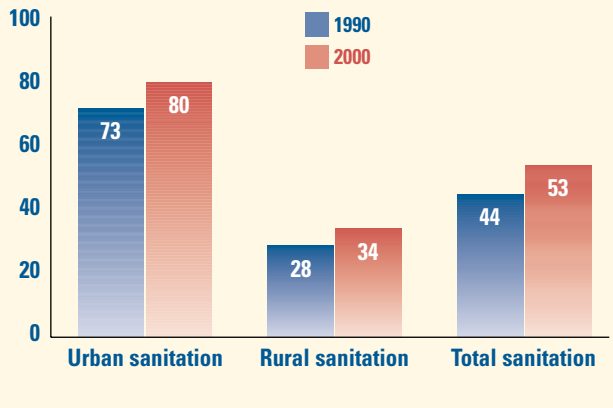


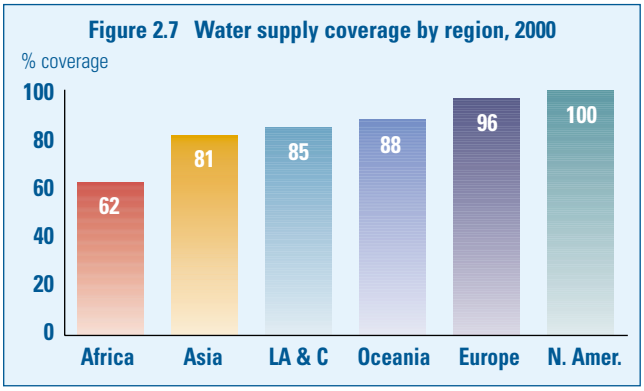
Figure 2.6 Sanitation coverage for Africa, Asia, and Latin America and the Caribbean

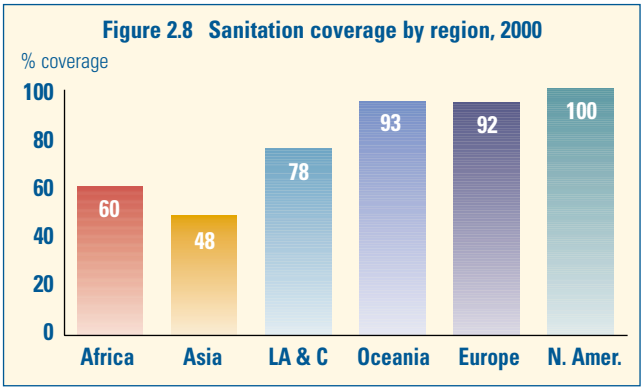


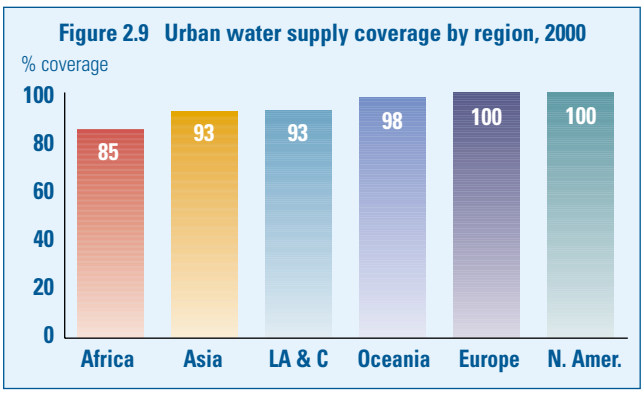
2.3 Regional coverage in 2000

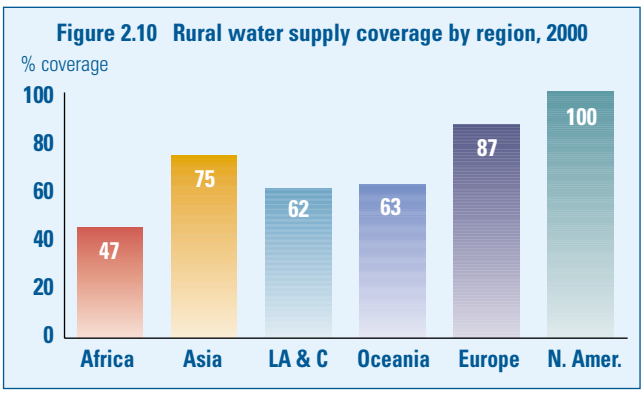
Figures 2.7 and 2.8 show that in every region, except Oceania and Northern America, total sanitation coverage is lower than total water supply coverage. As shown in Table 2.2, global water supply coverage is estimated at 82% and global sanitation coverage is estimated to be 60%.

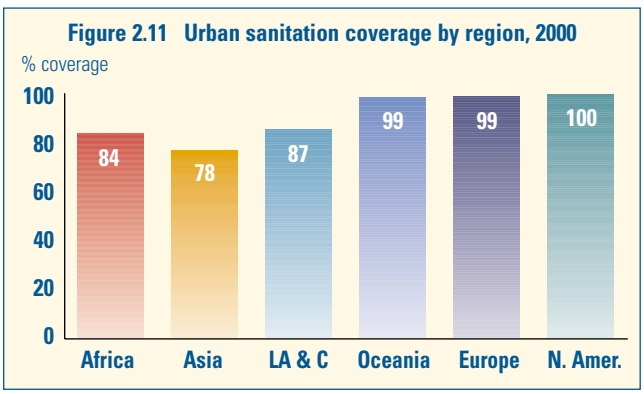
Figures 2.9 – 2.12 show that urban coverage is significantly higher in most regions than rural coverage. Furthermore, rural coverage tends to be far more variable between regions than urban coverage. For example, urban water supply coverage in 2000 varies only from 85% in Africa to 100% in Europe and Northern America, while rural water supply coverage varies from 47% in Africa to 100% in Northern America. These interregional variations are most stark for rural sanitation, with Asia having only 31% coverage, while Northern America has 100% coverage.

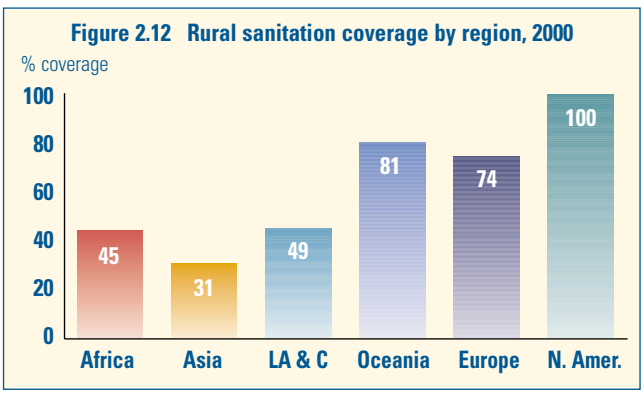






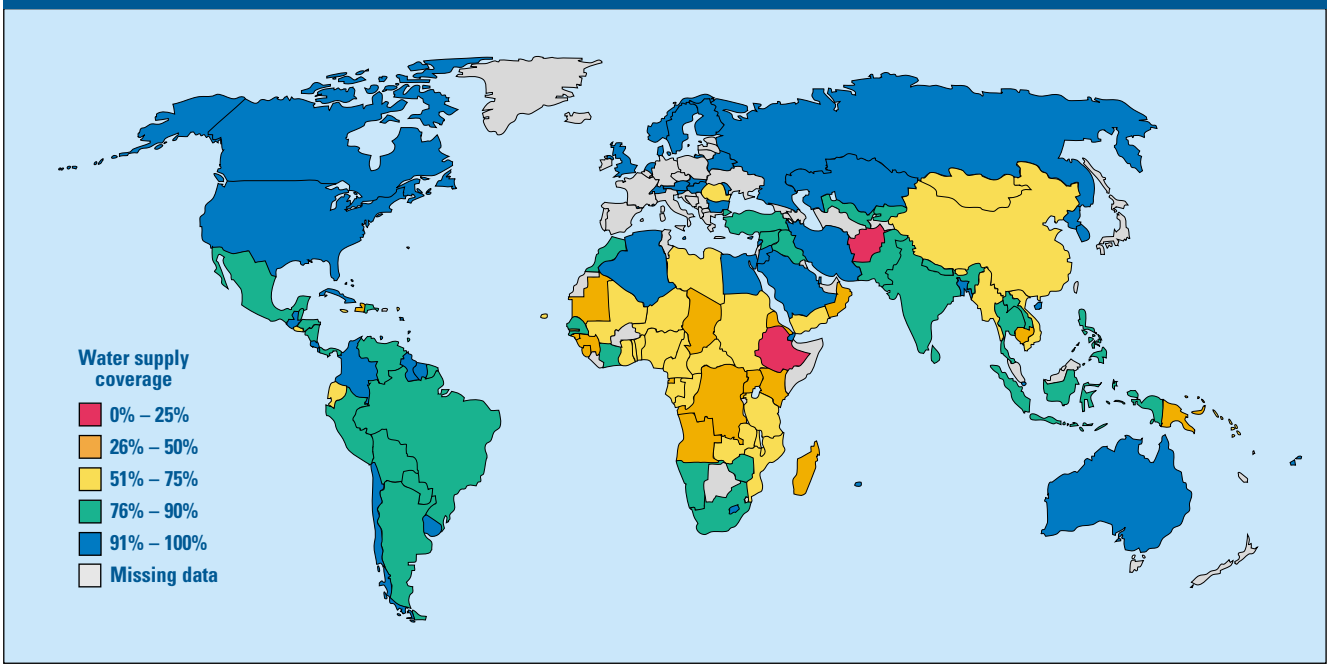




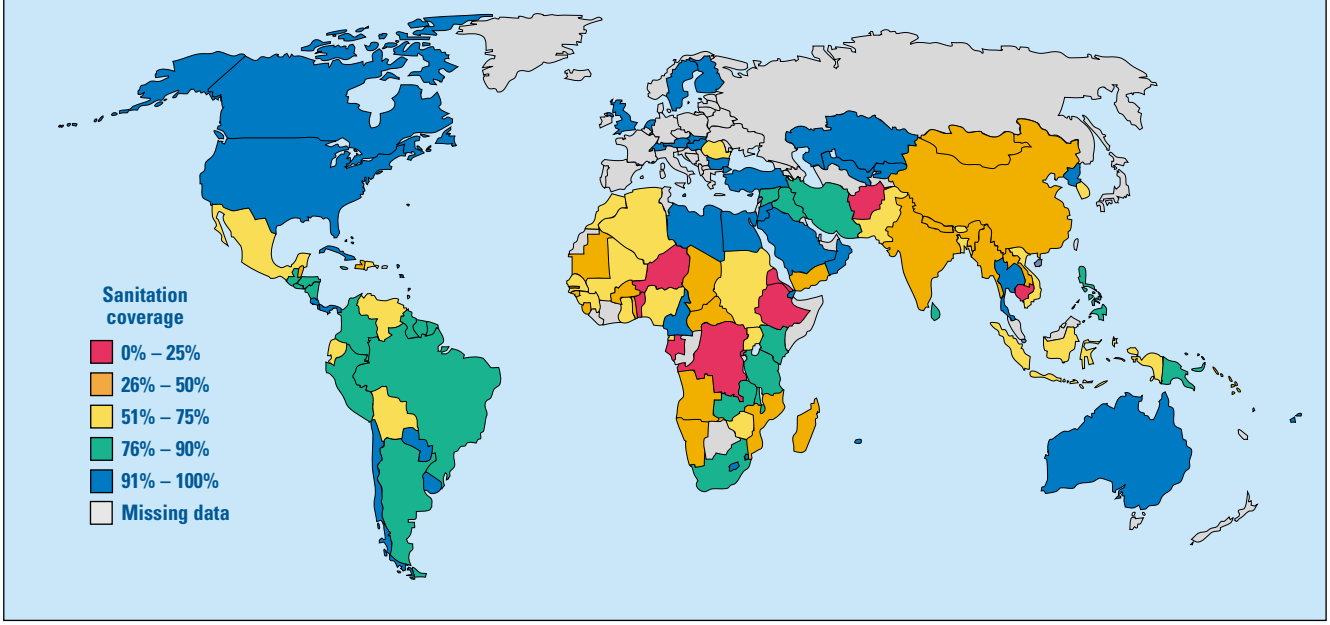


Maps 2.1 and 2.2 present coverage categories for improved drinking-water supply and improved sanitation. The mapped data for individual countries, areas or territories are presented in tables in Chapters 6–11. The maps show coverage by categories of 25%, 50% and 75%, but at the upper end of the scale an extra category is provided, 91%–100%. This is done to highlight differentials within regions such as Latin America and the Caribbean, where many countries would fit into the category of 76%–100%. The maps show clearly how sanitation coverage is much lower than water supply coverage, especially in Asia and Africa. It is also obvious from Map 2.1 how many African countries have low coverage for improved water supply.

MAP 2.1 WATER SUPPLY, GLOBAL COVERAGE, 2000



MAP 2.2 SANITATION, GLOBAL COVERAGE, 2000



Levels of service are an important factor to consider when looking at the findings of the Assessment 2000. Country-reported data may reflect national definitions of "improved", unlike survey data which were standardized as far as possible (see Box 1.5). For example, in many African countries the population "without access" to improved sanitation means people with no access to any sanitary facility. In Latin America and the Caribbean, however, it is more likely that those "without access" in fact have a sanitary facility, but the facility is deemed unsatisfactory by the local and/or national authorities. Low coverage figures found for Latin America and the Caribbean may in part be a reflection of the comparatively narrow definitions used within that region. In Latin America and the Caribbean, for example, 66% of the population has access to piped water through household connections, whereas only 24% of the population in Africa and 49% of the population in Asia has access to this type of service. With sanitation, 49% of the population in Latin America and the Caribbean has access to sewer systems, whereas only 13% of the population in Africa and 18% of the population in Asia has access to this type of service.

Figures 2.13–2.16 present percentage coverage with household water supply and sewerage connections, as well as other types of access, in three regions: Africa, Asia, and Latin America and the Caribbean. Only these three regions were considered here, as Europe and Northern America present coverage figures close to 100%. The figures for the percentage coverage of Oceania's population are influenced by Australia's nearly total coverage. The figures for Africa, Asia, and Latin America and the Caribbean show the coverage status of developing regions.

The data used to estimate access to household connections come from both household surveys and from past information made available to WHO by providers of services (usually government agencies). Both sources are considered to be reasonably reliable concerning data on household connections.

Figures 2.13 and 2.14 show the changes in access to water supply services over the past 10 years in Africa, Asia, and Latin America and the Caribbean. One of the striking findings is that the percentage of people having access to water supply through house connections has increased from 41% to 47%, whereas the percentage of people with other types of access has remained practically the same (ca. 31%). In Latin America and the Caribbean, although the total percentage of people having access to improved water supply has increased only slightly, there has been a considerable increase in the proportion of house connections, from 60% to 66%. The region still has both the highest level of coverage through household connections and the highest total coverage. The above figures imply that the limited progress in improving overall water supply coverage during the 1990s was accompanied by a significant improvement in the level of service enjoyed by those considered as "covered" and is an important finding of the Assessment 2000.

Nearly 82 million additional people in Africa, 418 million in Asia and 79 million in Latin America and the Caribbean gained access to water supply through a house connection during the 1990s. The increase in population over the same time was 169 million in Africa, 502 million in Asia, and 79 million in Latin America and the Caribbean. Therefore, only 49% of the "new" African population of the past 10 years was provided with a household connection, whereas 83% of the "new" Asian population, and all of the "new" Latin America and Caribbean population, had access to a household connection. Detailed coverage figures for household connections will be given in the JMP Databook 2000.

Evidence shows that the quantity of water used per capita depends on the accessibility of the water source. Those having access through a house or yard connection, or through a well inside the property, will use larger quantities of water than those having to fetch water outside, even if such a source is only a few minutes' walk from the house.

Figure 2.13 Africa, Asia, and Latin America and the Caribbean: water supply coverage by category of service, 1990

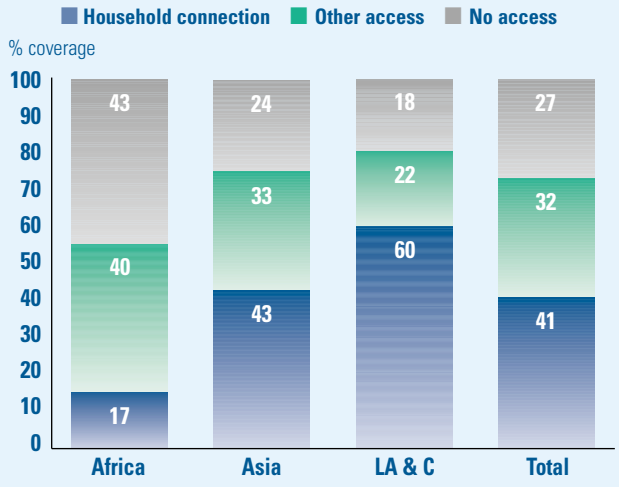


Figure 2.14 Africa, Asia, and Latin America and the Caribbean: water supply coverage by category of service, 2000

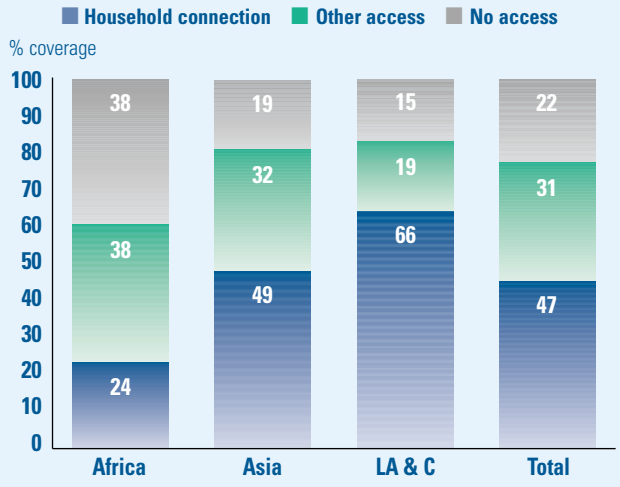


Figure 2.15 Africa, Asia, and Latin America and the Caribbean: sanitation coverage by category of service, 1990

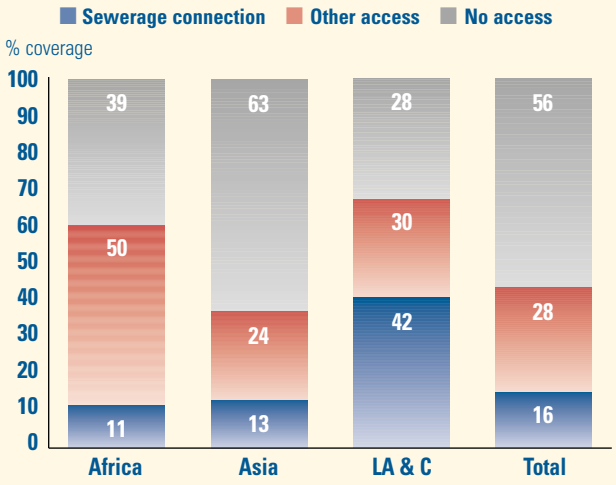
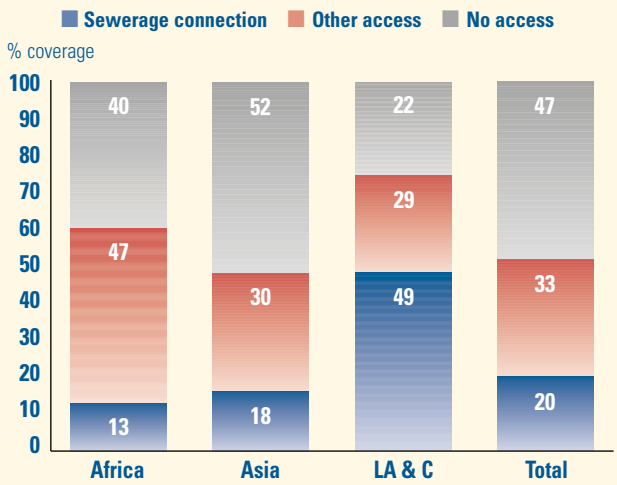


Figure 2.16 Africa, Asia, and Latin America and the Caribbean: sanitation coverage by category of service, 2000



Figures 2.15 and 2.16 show the changes between 1990 and 2000 in the proportion of people in Africa, Asia, and Latin America and the Caribbean with access to sanitation services through household connections and other means.

In Africa, although the proportion of people who have access to a flush toilet connected to a sewer system increased slightly from 11% to 13%, there has been no progress in terms of the percentage of the population with access to any type of improved sanitation. Moreover, the 34 million people in Africa who gained access to a sewer connection over the 1990s represent only 20% of the new African population (169 million people).

In Asia, the proportion of people with access to a household sewer connection increased from 13% in 1990 to 18% in 2000, and there has also been a considerable increase in the total numbers of people with access to improved sanitation. However, of the 502 million new inhabitants of this region, only 241 million (or 48%) gained access to a sewer connection.

Latin America and the Caribbean has the highest rates of sanitation coverage among the developing regions. Of the 79 million new inhabitants in this region, 68 million (or 86%) gained access to a sewer connection.

More information about levels of service is given in Chapter 3, which deals with sector performance.

It is important to bear in mind that only a fraction of the wastewater collected through sewer systems in developing countries is being treated and disposed of properly. Most of this wastewater is discharged directly into rivers, lakes and oceans without any treatment. This has serious consequences for the health and economic development of those affected, especially in downstream and coastal populations, and for the ecology (see Chapter 3, Sector Performance).

3. Sector performance

This chapter provides information on planning and management in the water supply and sanitation sector, including targets for the sector, constraints to sector development, sector investment, costs and tariffs, and quality of service.

During the preparation phases of the Assessment 2000 report an effort was made to gather information on the performance and management of the water supply and sanitation sector in each country. This information included constraints to development, costs, tariffs, levels of investment and aspects of quality of service, such as continuity and water quality. Also included were approaches and institutional arrangements for managing the sector. The responses of individual countries will be presented in the JMP Databook 2000. This chapter provides an overview of the information collected.

3.1 Sector constraints

Of all the potential constraints to the development of the water supply and sanitation sector, four were ranked among the top 10 in every region of the world. One of these, logistics, is something of a catch-all category and has no simple solution. The other three principal constraints are unambiguous and interrelated. They are: funding limitations, inadequate cost-recovery, and inadequate operation and maintenance.

The constraints identified by the Assessment 2000 are similar to those identified by the Operation and Maintenance Working Group *(11),* which in varying degrees affect countries, districts, towns, villages and communities throughout the developing world. The identified constraints are:

- **Financial difficulties.**
- **Institutional problems.**
- **Inadequate human resources.**
- **Lack of sector coordination.**
- **Lack of political commitment.**
- **Insufficient community involvement.**
- **Inadequate operation and maintenance.**
- **Lack of hygiene education.**
- **Poor water quality.**
- **Insufficient information and communication**.

The importance of these constraints is borne out by other data presented in this report, such as the finding that, for many countries, water tariffs do not even meet the cost of water production, let alone the need of the sector to accumulate reserves for increasing capacity. Financial limitations are also a problem when the funds for investment are sufficient only to cover the recurrent costs of operation and maintenance. A frequent claim is that lack of involvement of communities in technology selection has been a major constraint. Various approaches and techniques have been developed to encourage local participation in identifying problems and ways to solve them. These participatory approaches need to be applied more intensively to increase the effectiveness of implementing water supply and sanitation services (Box 3.1).

BOX 3.1 COMMUNITY PARTICIPATION IN PROBLEM-SOLVING: THE PARTICIPATORY HYGIENE AND SANITATION TRANSFORMATION (PHAST) APPROACH

The PHAST approach encourages local participation in defining problems and solutions related to water, sanitation and disease control. The community itself analyses its own beliefs and practices and then decides what needs to be changed. Outside experts, such as local health personnel, water and sanitation engineers and social scientists, also participate and share information with the community.

The PHAST approach was created because professionals realized that traditional health education techniques were not very effective in the water supply and sanitation sector. It is based on the following proven principles of adult learning and community development:

- Communities can and should determine their own priorities for disease prevention.
- Communities possess a huge store of health-related experience and knowledge, often including both traditional and modern wisdom.
- When people understand why improved sanitation is to their advantage, they will act.
- All people, regardless of their educational backgrounds, are capable of understanding that faeces carry disease and can be harmful, and can learn to trace and describe the faecal–oral route of disease transmission within their own environment.
- Communities can identify appropriate barriers to block disease transmission.

Source: *(12)*

3.2 Investment in Africa, Asia, and Latin America and the Caribbean

Figures 3.1–3.6 show the investments in water supply and sanitation for Africa, Asia, and Latin America and the Caribbean. Two sources of investment are shown: investment from government agencies (national) and investment from external support agencies. Investments were averaged over the years 1990–2000 for each country that provided information. A total investment was then determined for all the countries that provided data and extrapolated for the whole region. Data were not available for Europe, and there were only five returns from Oceania, all from small islands, which cannot be considered sufficiently representative of the region. The data received from Northern American countries are not sufficient to determine regional statistics. This section, therefore, deals only with Africa, Asia, and Latin America and the Caribbean, for which the information available appears to be representative. Investments made directly by householders that were independent of government aid (for example, for the construction of a private latrine), are unlikely to have been included in the country figures reported. It is also possible that the national investment figures provided by some of the countries might have included loans from international development banks.

Figure 3.1 deals with investment in urban water supply. The corresponding investment in rural water supply is shown in Figure 3.2. It is clear that the level of investment in rural water supply in Latin America and the Caribbean is far lower than the corresponding investments in Asia and Africa. This can be explained by the fact that the rural population of Latin America and the Caribbean is much smaller than the rural populations of Africa and Asia. Furthermore, the investment in rural water supply is less than that in urban water supply for every region, despite the huge gaps in rural coverage; and the total investment in rural water supply is roughly half that in urban water supply, whether from local or external sources (cf. Figures 3.1 and 3.2).

Investment in urban sanitation is shown in Figure 3.3. In all of the regions shown, the figures indicate a much lower level of investment in sanitation than in urban or rural water supply. Africa's dependence on external sources of investment is clearly illustrated, as is the substantially higher local investment level in Latin America and the Caribbean. Latin America and the Caribbean also successfully attracted more external contributions than other regions.

With regard to rural sanitation, Figure 3.4 shows that investment is very small when compared with levels of investment in rural water supply or urban sanitation (cf. Figures 3.2 and 3.3). Again, the level of investment in Latin America and the Caribbean compares favourably with practically all other regions, bearing in mind the small rural population.

Figure 3.1 Annual investment in urban water supply in Africa, Asia, and Latin America and the Caribbean, 1990–2000

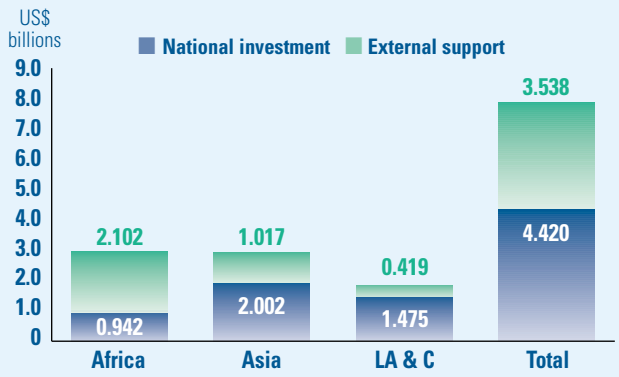


Figure 3.2 Annual investment in rural water supply in Africa, Asia, and Latin America and the Caribbean, 1990–2000

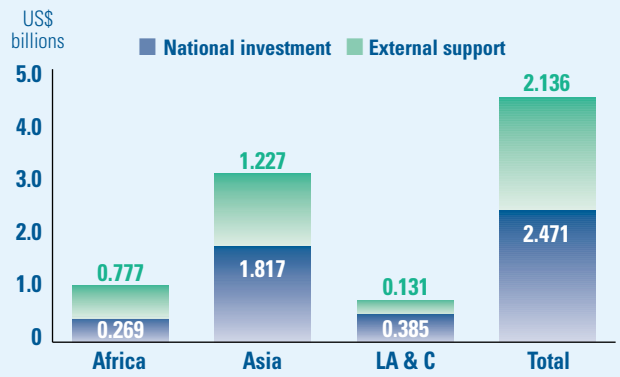


Figure 3.3 Annual investment in urban sanitation in Africa, Asia, and Latin America and the Caribbean, 1990–2000

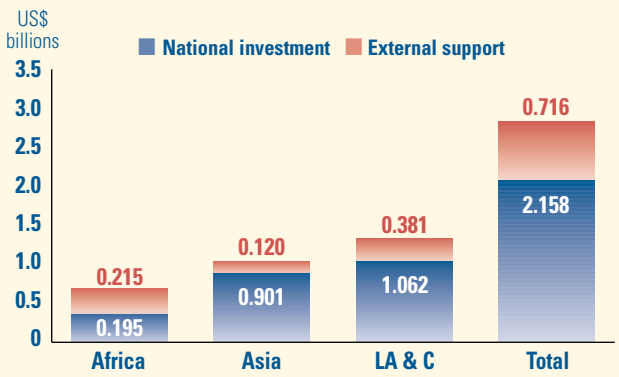


Figure 3.4 Annual investment in rural sanitation in Africa, Asia, and Latin America and the Caribbean, 1990–2000

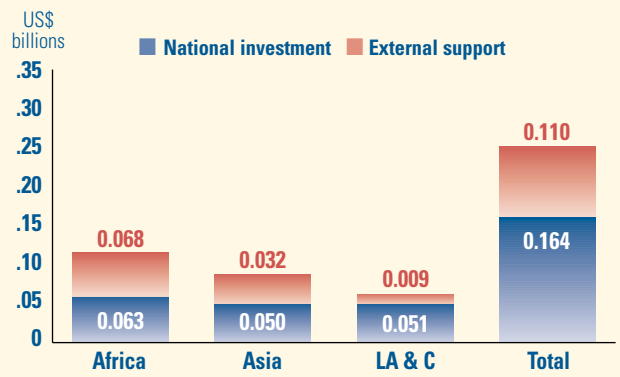


Figure 3.5 shows the total annual local and external investment in water supply and sanitation. In terms of total investment, Africa received the most external investment for the water supply and sanitation sector, but also invested fewer local resources than any other region. The importance of external support is evident (Box 3.2).

Sanitation is not normally considered a priority in development projects and a comparison of the total investment in water supply with the total investment in sanitation makes the relative neglect of sanitation abundantly clear (Figure 3.6).

The current low level of sanitation coverage (only 60% of the global population has access to any sort of improved sanitation) appears to be explained in part by the low level of investment in sanitation when compared with the investment in water supply. Of the total annual investment in the sector, approximately US$ 16 billion, only one-fifth seems to be directed to sanitation. Despite that relatively low level of investment the progress over the decade, measured in terms of additional people served with sanitation facilities, has been huge. The reason for this progress might be that investment has been made not only by governments and external support agencies, but also directly by householders through low-cost technologies. Such investment, however, is not likely to appear in the statistics.

Figure 3.5 Total annual national and external investment in water supply and sanitation in Africa, Asia, and Latin America and the Caribbean, 1990–2000

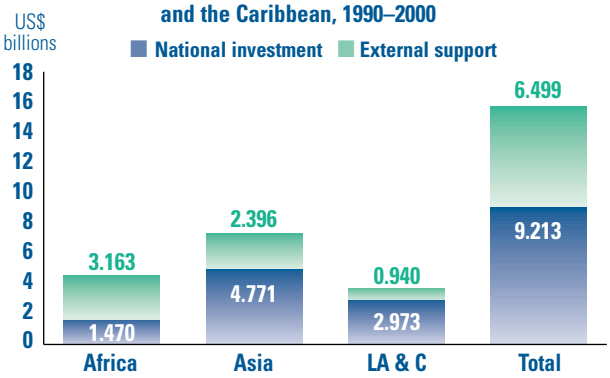
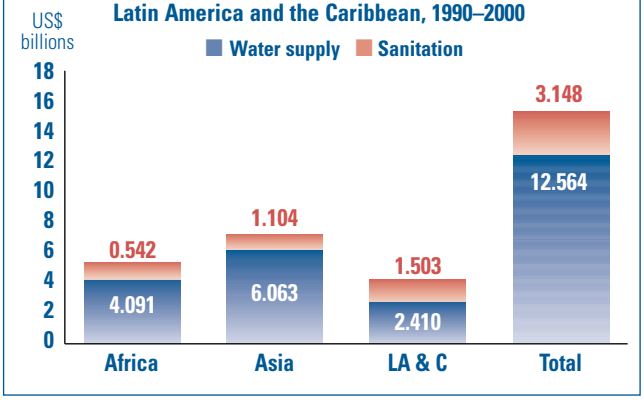


Figure 3.6 Total annual investment in water supply compared to total annual investment in sanitation in Africa, Asia, and Latin America and the Caribbean, 1990–2000



BOX 3.2 SUPPORT PROVIDED FOR THE WATER SUPPLY AND SANITATION SECTOR IN DEVELOPING COUNTRIES

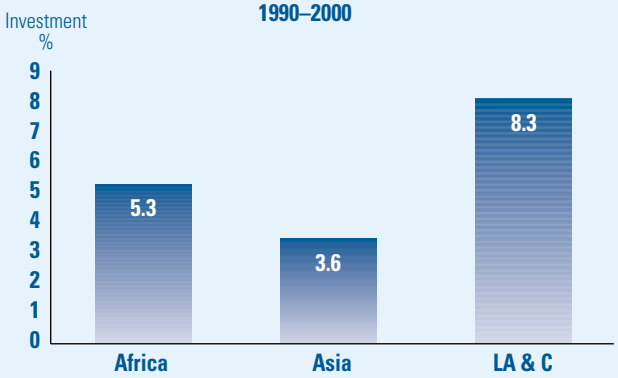
Most member states in the Organisation for Economic Co-operation and Development (OECD) have provided strong support for developing countries in efforts to improve the water supply and sanitation sector. For OECD countries as a whole, the proportion of development assistance devoted to water supply and sanitation increased steadily from 1986–1996, rising from 3.4% (France and New Zealand data missing) to 6.6% of total assistance. In terms of cash, bilateral commitments from OECD countries for assistance to developing countries rose from US$ 1.034 billion (France and New Zealand missing) in 1986 to US$ 2.907 billion in 1996. In absolute terms, Germany and Japan were particularly big contributors to the sector over the period 1986–1996: Germany spent nearly US$ 3.4 billion on developing water supply and sanitation systems, while Japan invested over US$ 9.5 billion.

Year	Water supply and sanitation as a percentage of total cooperation 1986–96	Cooperation to water supply and sanitation 1986–96 (US$ billions)
1986	3.4	1034
1987	3.7	1323
1988	4.2	1866
1989	3.8	1508
1990	3.2	1844
1991	3.2	1835
1992	4.2	2124
1993	5.5	2727
1994	5.1	2552
1995	5.6	3034
1996	6.6	2907

Source: *(13)*

Figure 3.7 shows governmental investment in water supply and sanitation as a proportion of overall governmental investment. Among the three regions, the proportion invested in water supply and sanitation is highest in Latin America and the Caribbean, and is more than double that invested in Asia. The difference in the levels of investment shows what is feasible when there is the will to resolve the sector's shortcomings.

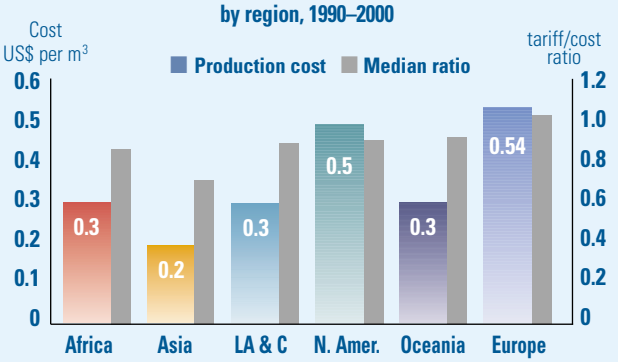
Figure 3.7 Median total investment in water supply and sanitation as a percentage of overall government investment, 1990–2000



3.3 Costs and tariffs of urban services

Overall, there was remarkably little variation in the median unit production cost of water between developing regions of the world, although the variation was greater between subregions and between countries. Figure 3.8 shows that more than half the countries of each region (except for Europe and Northern America) charge an urban water tariff that is less than the unit cost of production of the water.

Figure 3.8 A comparison of the median unit production cost of urban water supply and the median tariff / production cost ratio by region, 1990–2000



Regional median tariffs per cubic metre for water and sewerage services are shown in Figure 3.9. The highest median tariff for water is found in Europe and the lowest in Asia. Between these two extremes the other regions show remarkably little variation compared with the variation between individual countries within each region. Sewerage tariffs are also shown and they are lower than the water tariffs. The sewerage tariffs for Oceania are not shown, as only a few countries provided reliable relevant information.

Analysis of available information leads to the conclusion that water tariffs do not cover the full cost of the services provided. Although there is insufficient information to allow for graphical presentation, it appears that standpipe charges are considerably lower than charges for house connections. In urban areas standpipes may be seen as the minimum acceptable social provision for overall protection of human health; maintaining at least this level is therefore a priority. In Latin America and the Caribbean, the median standpipe charge is nil, as is the case for a number of individual countries in the other regions. A possible reason why water collected from standpipes is not paid for is that standpipe charges are difficult to collect. However, the fact that charges are not applied frequently causes these services to be unsustainable. Experience suggests that a possible way of overcoming this difficulty is for communities to manage their water points. Such management includes charging for the water delivered, according to an agreement with the water agency. The small revenue from these charges ensures the operation and maintenance of the standpipe facilities. When the users of standpipes cannot afford the costs implied in operating and maintaining the system, cross-subsidization by a relatively small surcharge on house connections is a possible solution.

Figure 3.9 Median water supply and sewerage tariffs by region, 1990–2000

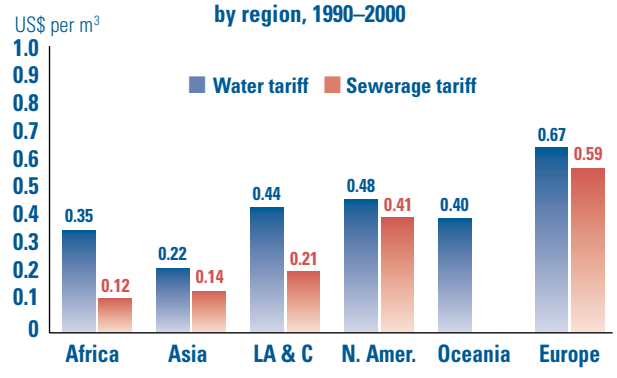
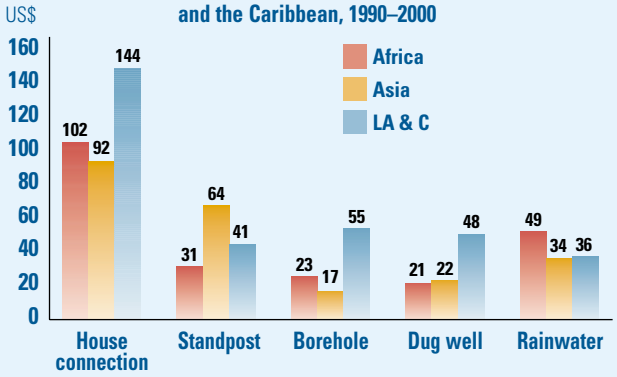


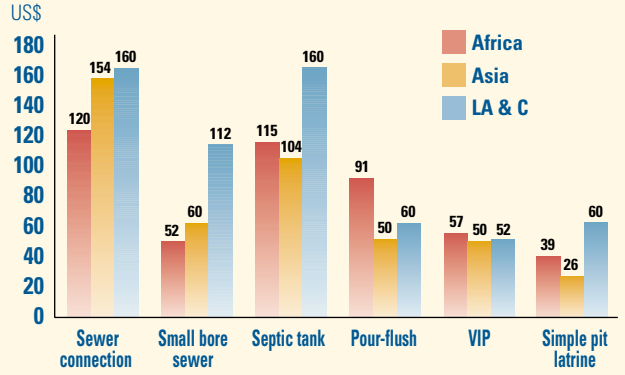
Figure 3.10 shows the average reported construction costs of different types of water supply facilities. The variations between regions are to some extent the result of differing water resource endowment, differing unit costs for construction in general, and differing levels of service offered. The figures should be considered rough estimates. They may vary widely because costs will be significantly affected by factors such as population density and ease of access of water sources.

Figure 3.10 Average construction cost per person served of water supply facilities for Africa, Asia, and Latin America and the Caribbean, 1990–2000



The average construction costs for a range of sanitation facilities are shown in Figure 3.11. While simple on-site systems tend to be cheaper than systems such as sewerage and septic tanks, the difference is sometimes less than might be expected. There is still a need for less costly sanitation facilities that meet the needs of the poor. The provision of such facilities is also important in protecting public health. Because the level of facilities associated with the indicated costs are not clear, the average costs presented in Figure 3.11 should be used with caution.

Figure 3.11 Average construction cost of sanitation facilities for Africa, Asia, and Latin America and the Caribbean, 1990–2000



3.4 Quality of service

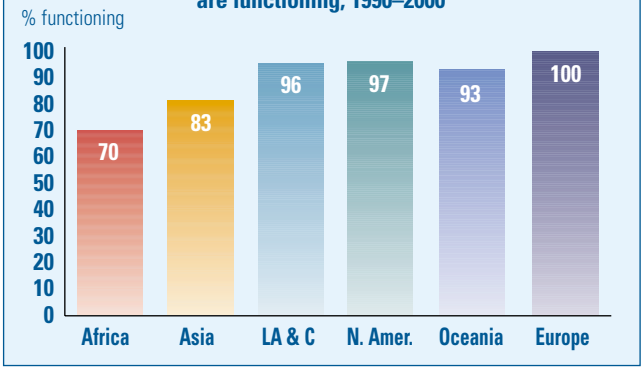
It is estimated that over one-third of the urban water supplies in Africa, and in Latin America and the Caribbean, and more than half those in Asia, operate intermittently. Intermittent water supply is a significant constraint on the availability of water for hygiene and encourages the low-income urban population to turn to alternatives such as water vendors. These vendors often charge many times more than the formal water tariff for water that is often of doubtful quality and not available in adequate quantities.

While the average intermittent system is reported to operate for more than half the time, this disguises large local variations between systems and within each distribution network. When there is frequent intermittence in the water distribution system, the consumers are commonly equipped with domestic storage tanks. Although these devices help to reduce hourly peaks in demand and mask short-term interruptions for users, they are often neither properly protected nor regularly cleaned and disinfected, which creates considerable risks of contamination. When the systems function intermittently, contamination may also occur by intrusion of contaminated water into the pipelines through faulty joints, cracks, etc. In addition, the pipelines are subject to additional stress caused by transient flows, affecting the durability of the system and weakening pipes and joints.

Many urban drinking-water systems do not disinfect the water. The information provided by countries indicates that roughly one in five systems in Africa, Asia, and Latin America and the Caribbean, and two in five systems in the small islands of Oceania, are not disinfected. The low prevalence of disinfection in some developing countries suggests that factors such as cost, maintenance of equipment and concern about chlorination by-products may be involved. This gives cause for concern, as failure to disinfect drinking-water can put public health at far greater risk than the by-products of chlorination *(14)*.

No one familiar with the rural water supply sector will be surprised at the finding that a substantial proportion of rural systems fail to function at any given time (Figure 3.12). Piped systems were considered to be "functioning" if they were operating above 50% of their design capacity on a daily basis. For handpumps, "functioning" was taken to mean that they operated for more than 70% of the time, with a time lag between breakdown and repair not greater than two weeks.

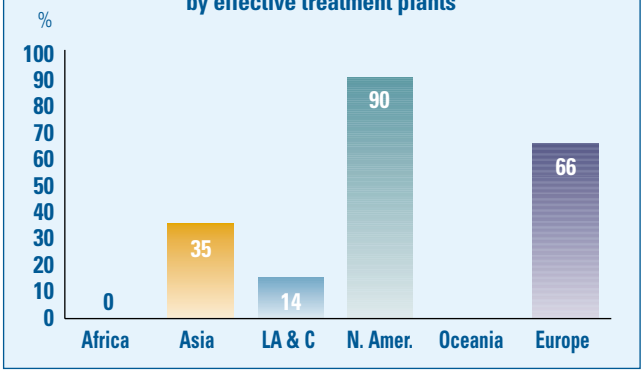
Figure 3.12 Median percentage of rural water supplies which are functioning, 1990–2000



The true figures may well be worse than those shown, as few countries keep systematic records of breakdown rates in rural areas at central level. In addition, many rural supplies, while meeting the definition of "functioning", do not in fact provide a satisfactory service, because of deficiencies in water quality, unsuitable location or restrictions on their use. The relatively low proportion of rural systems functioning in Africa is understandable in light of the limited resources available and the large distances between water supplies, which are related to low population density in much of the continent.

The lack of treatment of wastewater is another health hazard. Figure 3.13 shows the median percentage of urban wastewater collected through sewerage systems that is reported to be treated in sewage treatment plants. In the developing regions of the world, treatment is applied in only a minority of systems. Even in the industrialized countries, for example in Northern America, sewage is not universally treated. The available information on Oceania is insufficient to provide statistics for the region.

Figure 3.13 Median percentage of wastewater treated by effective treatment plants



The discharge of untreated sewage is especially hazardous to health where the receiving water bodies are rivers or lakes and where, as in some developing countries, these may be used untreated as sources of drinking water. In such cases, conventional treatment methods do not necessarily provide the requisite degree of pathogen removal for health protection. In practice, inappropriate technologies are often used. Raw sewage discharge can also harm the environment, though this impact may be minor if there is sufficient dilution.

3.5 General planning and management

Figure 3.14 shows the proportion of countries, among those that responded, which have prepared or are currently preparing water supply and sanitation plans. There was no significant difference between the regions and more than half the countries had already prepared plans. Altogether more than four out of five had either prepared a plan or were doing so.

Figure 3.14 Plan status for water and sanitation coverage

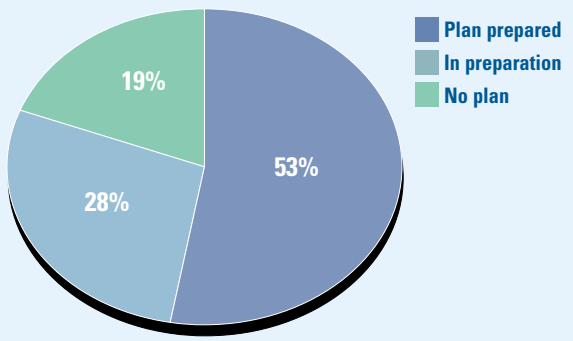


Figure 3.15 shows the proportion of responding countries that have established, or have partially established, a set of targets for coverage with water supply and sanitation in urban and rural areas. The proportions are broadly similar because targets tend to be established as part of the plan preparation procedure. Between regions, too, only small variations were seen. A somewhat smaller proportion of countries in Oceania have established targets, and this may reflect the limited planning capacity of the small island states.

Figure 3.15 Target status for water and sanitation coverage

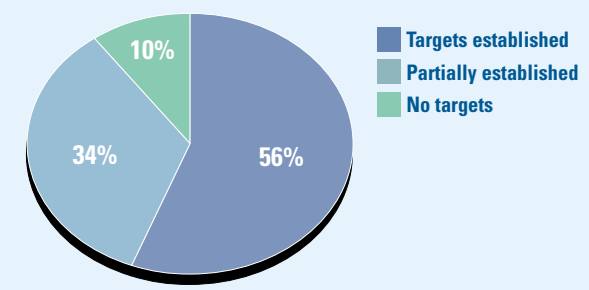
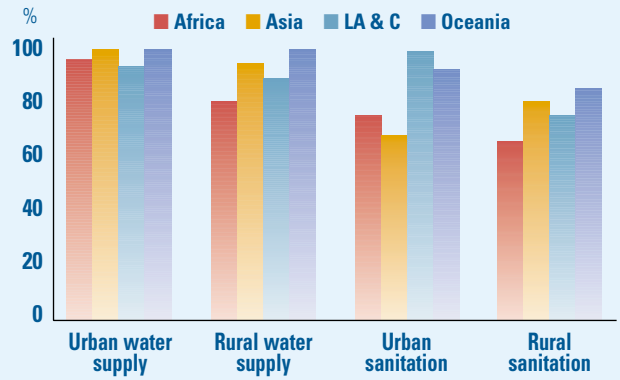


Figure 3.16 shows the median coverage targets established in each region. The targets for sanitation are generally lower than the corresponding targets for water supply, and those for rural areas are mostly lower than those for urban coverage. The available information suggests that the current bias in resource allocation towards urban areas and away from the rural population, and also towards water supply and away from sanitation, is set to continue unless specific efforts are made to change policy.

Figure 3.16 Median coverage targets for water supply and sanitation, by region



There are differences in the targets between regions, particularly regarding rural coverage. The relatively modest targets of Africa for sanitation, and of Latin America and the Caribbean for rural water supply and sanitation, are especially noteworthy.

It is hoped that the new survey-based coverage figures presented in this report will spur a revision of plans and policies. Many of the current targets are based on providers' estimates of coverage and are lower than current estimates of coverage ascertained by household surveys. These targets are therefore in urgent need of revision.

Figure 3.17 shows the results of an enquiry regarding the management of rural water supply facilities. More than half the countries in each region, with two exceptions, reported that they have a national policy for the community management of rural water supply and sanitation facilities. The two exceptions were Northern America, for which only two country returns were received, and Oceania where the returns were predominantly from small island states, which in many cases do not have a distinct rural sector.

Figure 3.17 Management of rural water supply

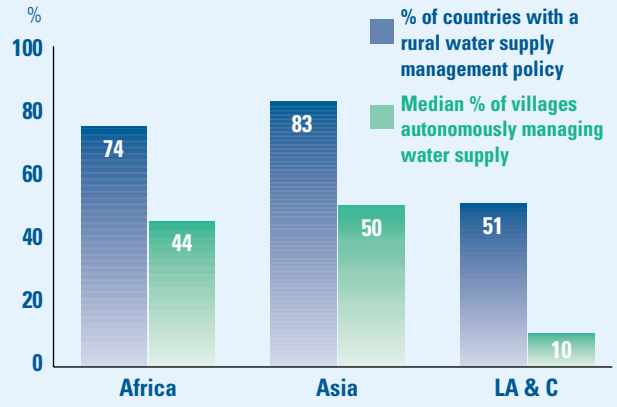


Figure 3.17 also shows the median proportion of rural communities reported to manage their own water supply systems. Bearing in mind the difficulties encountered by village institutions in managing infrastructure, these proportions are remarkably high. The low figure for Latin American and the Caribbean region also seems to be due to the presence of many Caribbean island states, where maintenance is the responsibility of the urban water supply agency.

In all regions of the world, the majority of urban water supply utilities are still publicly operated (Table 3.1). Nevertheless, many countries reported a degree of private sector participation in delivering urban water supply services. This participation involves not only large private utility companies, but also organizations such as nongovernmental organizations, community-based organizations and religious groups. When the contractual arrangements were specifically mentioned, the options most commonly cited by developing countries were concessions and management contracts. A number of reports, particularly from African countries, mentioned that the countries were moving towards greater private sector management of water supply.

TABLE 3.1 PUBLIC PROVISION OF URBAN WATER SUPPLY

Region	Median %
Africa	100
Asia	93
Latin America and the Caribbean	92
Northern America	55
Oceania	90
Europe	90

In many countries, the institutions that manage the water supply and sanitation sector, and particularly the sanitation subsector, are fragmented. In half the countries reporting, rural water supply is the responsibility of a ministry that is principally or largely concerned with water. In one in 10 of the countries of Asia, Africa and the Americas which reported, no national body is identifiably responsible for either urban or rural sanitation.

This Assessment 2000 covered a substantial number of industrialized countries, and their reports on management of rural and urban water supply and sanitation are in contrast to those from the developing world. In the richer countries, the operational functions of the central government agencies are practically non-existent and these agencies play an essentially regulatory role. Operational issues are devolved to local governments and other bodies at state, provincial or municipal levels. The relative concentration of operational functions at national level in the developing countries may, to some extent, be due to weak local government, but is also favoured by the need of external support agencies, and the governments they support, for a central point of contact.

4. Water supply and sanitation in large cities

This chapter provides information on various aspects of water supply and sanitation services in large cities, as reported in response to the questionnaire. It complements the findings of the previous chapter.

4.1 Urbanization

As noted in previous chapters, high rates of urban population growth will place particularly heavy demands on the capacity of the developing countries to extend, or even maintain, their service coverage. It is therefore useful to look more closely at water supply and sanitation in the largest cities in the world. The cities for which information was provided for this analysis (but not necessarily all the information requested) are listed in Table 4.1.

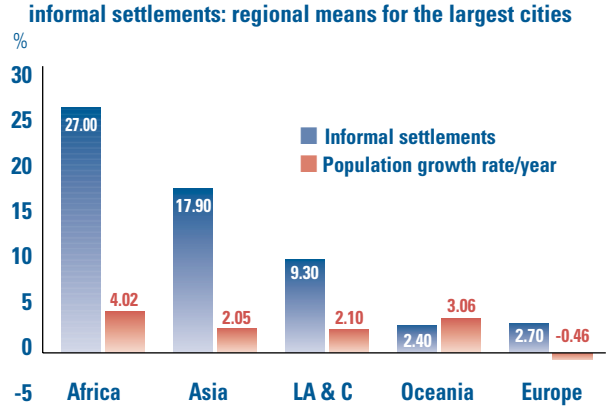
TABLE 4.1 CITIES PROVIDING INFORMATION FOR ANALYSIS OF WATER SUPPLY AND SANITATION

Africa	Asia	Europe	Latin America & Caribbean	Northern America	Oceania
Abidjan	Amman	Andorra-la-Vella	Asunción	Toronto	Apia
Accra	Bangkok	Budapest	Barquisimeto	New York	Funafuti
Addis Ababa	Colombo	Copenhagen	Basseterre		Honiara
Algiers	Dhaka	Ljubljana	Belize		Koror
Antananarivo	Jakarta	Monaco	Buenos Aires		Nuku'alofa
Asmara	Kathmandu	Oslo	(Metro region)		Port-Vila
Bamako	Malé	Stockholm	Cali		Rarotonga
Bangui	Mumbai	Tallinn	Camagüey		Saipan
Bissau	Nicosia	Vienna	Castries		South Tarawa
Blantyre	Seoul	Vilnius	Cayenne		
Brazzaville	Shanghai	Zagreb	El Progreso		
Bujumbura	Tbilisi	Zurich	Guatemala City		
Cairo	Teheran		Guayaquil		
Casablanca	Thimphu		Kingston		
Conakry	Ulaanbaatar		Kingstown		
Cotonou	Yangon		Lima		
Dakar			(Metro region)		
Dar Es Salaam			Managua		
Djibouti			Montevideo		
Douala			Panama		
Freetown			Paramaribo		
Gaborone			Plymouth		
Harare			Pointe-à-Pitre		
Kampala			Port-au-Prince		
Kigali			Port-of-Spain		
Kinshasa			Providenciales		
Libreville			Roseau		
Lomé			San José		
Luanda			(Metro region)		
Lusaka			San Juan		
Malabo			San Salvador		
Maputo			Santa Cruz de la		
Maseru			Sierra		
Monrovia			Santiago		
Moroni			(Metro region)		
Nairobi			Santo Domingo		
N'djamena			São Paulo		
Niamey			St. George's		
Nouakchott			St. John		
Ouagadougou					
Port Louis					
Sao Tome					
Windhoek					

The information from large cities has been provided by water supply and sanitation agencies, which normally generate substantive and reliable managerial information about their systems. Some of the findings in this chapter are presented as medians, rather than as means, given the huge population disparities between the large cities. For example, São Paulo, Brazil, has a population of 11 million people, whereas Roseau, Dominica, has a population of only 16 000 people. The information received from Europe, Northern America and Oceania is, in some cases, insufficient for a consistent analysis of some of the topics. Thus, these regions are not always represented in the graphs.

Figure 4.1 shows, for each region, the mean population growth rate of the cities for which data were received, as well as the proportion of the population living in informal settlements. The population growth rate for Africa (4.02% per year) is about twice that for Asia (2.05%) and Latin America and the Caribbean (2.10%), indicating that the urbanization process in the latter two regions is relatively more stabilized. Oceania has an intermediate growth rate. The populations of the European cities show slight declines, but in Europe as elsewhere the mean value conceals a wide variation between cities. For example, while the population of Vilnius (Latvia) is increasing at 6.9% per annum, that of Tallinn (Estonia) is falling at 4.4%. Northern America is not indicated in the graph as only one city reported (Toronto, Canada).

Figure 4.1 Population growth rates and proportions living in informal settlements: regional means for the largest cities



4.2 Informal settlements

The high growth rate of Africa's urban population is reflected in the relatively large proportion living in informal settlements, or shanty towns (Figure 4.1). Many millions of people also live in informal settlements in Asia and Latin America and the Caribbean. The proportion for Oceania seems small in view of the urban growth rate, but many countries did not respond to the question about informal settlements. This may be because the settlements were not large enough to constitute a problem in the towns of the small islands of the region. It is also possible that informal settlements were difficult to define, involving terms such as a lack of physical planning, the type of house construction, or the lack of formal land tenure.

4.3 Types of water supply service

Figure 4.2 shows the mean percentage of the population served by various types of water supply in the large cities of each region. The figures for household connections and yard taps were based on suppliers' statistics, unlike most of the coverage data in this report which were mainly drawn from consumer surveys. Overall, an average of less than 5% of the people in every region had yard taps, and frequently it was reported that no one had yard taps. The number of yard taps reported may have been confounded with information regarding the domestic plumbing arrangements of consumer households, so the two categories (house connections and yard taps) are combined in Figure 4.2. As the pie charts show, with the exception of Africa, the majority of the population has house connections or yard taps.

Some returns treated people with access to public taps or handpumps as being "unserved," while others did not. Wherever possible, people with access to public taps or handpumps were treated as "served" to ensure uniformity in the analysis.

It is no coincidence that the regions with the most rapid growth in the largest cities also have the highest proportion of the population without access to services in those cities. Africa, with the highest growth rate, has been more successful than other regions in making good the shortfall, using public taps. Local sources, particularly boreholes or tubewells fitted with handpumps, have also been used to good effect, particularly in Asia. There is room for other regions of the world, particularly Oceania, to make more use of intermediate levels of service such as these, as well as yard taps.

BOX 4.1 WATER CONTAMINATION AND LOSS IN PIPED WATER SUPPLY

Essential action to ensure that a piped water supply remains safe and sustainable include:

- Preventing contamination.
- Minimizing water loss.

Contamination of distribution pipelines may arise from:

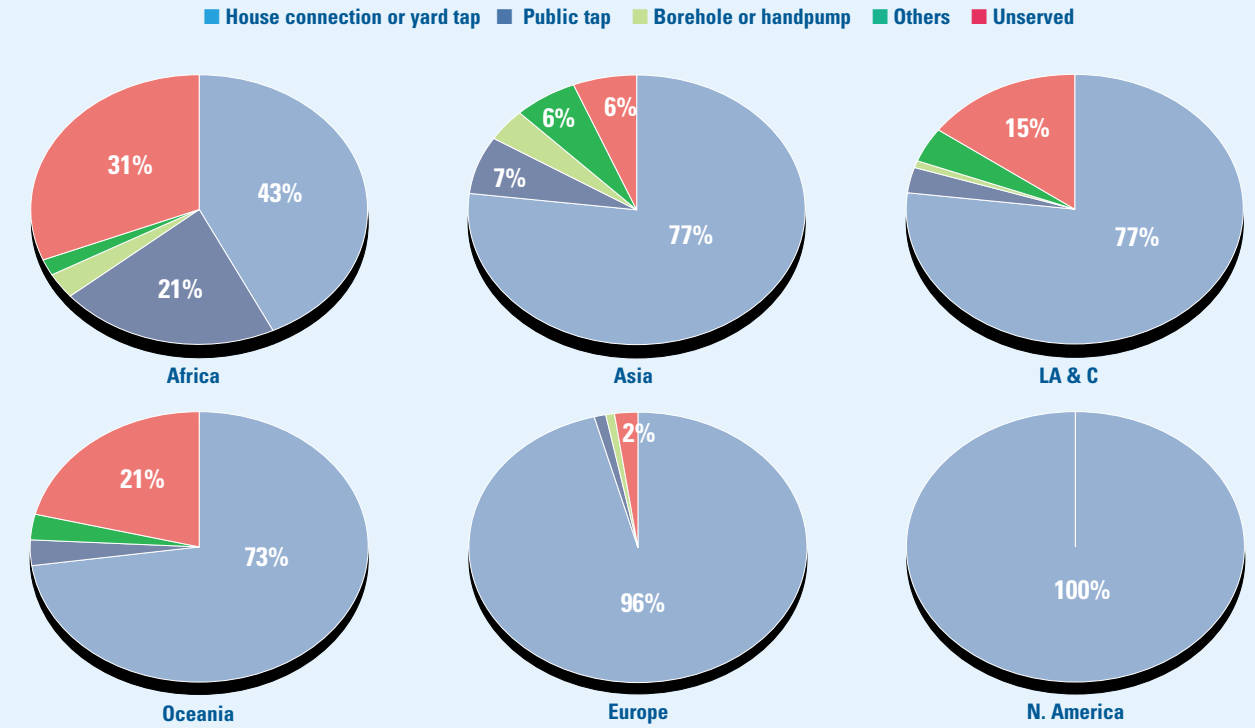
- Intermittent supply.
- Low water pressure in the distribution network.
- Leaking pipes.
- Inadequate wastewater collection systems.

Water loss (physical loss) often amounting to more than 50% of supplies, mainly arises from:

- Leaking pipes, joints and valves.
- Overflowing service reservoirs.
- Waste of water through illegal connections and non-metered house connections.

Source: *(7)*

Figure 4.2 Water supply in the largest cities: mean percentage of the population with each type of service, by region

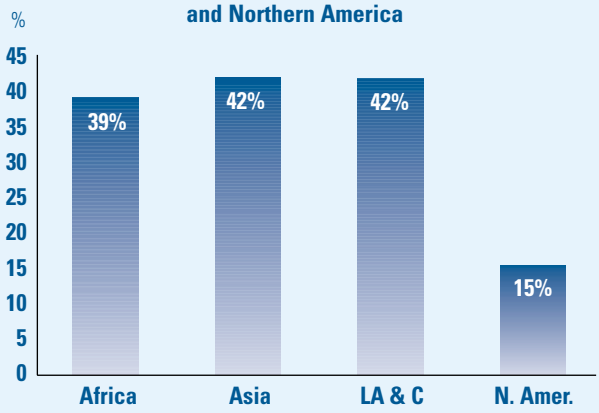


4.4 Accounting for water loss

The mean rates of unaccounted-for water are shown in Figure 4.3, by region. The figures for Northern America are low, but they are based on data from only two cities. From the responses to the questionnaire, it can be concluded that the majority of unaccounted-for water is represented by physical losses from the distribution system.

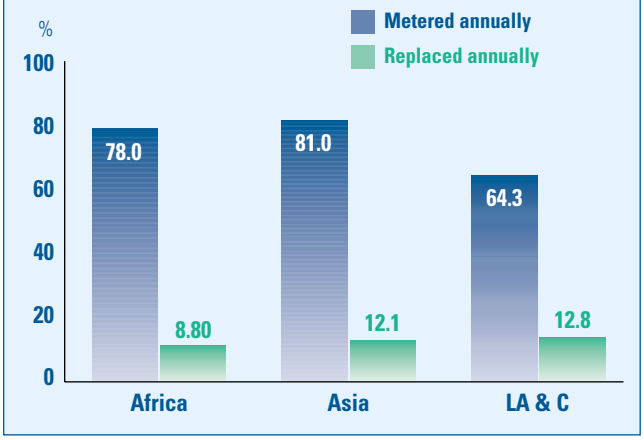
In many cases, the unaccounted-for water indicator reflects the efficiency of the management of a water utility. The reduction of unaccounted-for water requires coherent action to address not only technical and operational aspects, but also institutional, planning, financial and administrative issues (see Box 4.1).

Figure 4.3 Mean unaccounted-for water in large cities in Africa, Asia, Latin America and the Caribbean, and Northern America



As can be seen from Figure 4.4, the use of water meters is remarkably prevalent. The cities of Africa and Asia appear to use meters for roughly 80% of domestic consumers. The use of meters is slightly less prevalent in Latin America and the Caribbean. There is little difference in the frequency with which the meters are replaced in Africa, Asia , and Latin American and the Caribbean (Figure 4.4). The mean percentages replaced each year implies that each meter is replaced after eight years of service or more. Considering that the meters typically under-read as they age, it is likely that a considerable proportion of unaccounted-for water is explained by metering errors. The cost of meter replacement represents a substantial expenditure for a water supply agency; and in many countries it may comprise a high proportion of the foreign exchange expenditure in the water supply sector. It is not surprising, therefore, that meter replacement is kept to a minimum in the large cities of the developing world, even though this may have unfortunate consequences in terms of broken meters, poor customer relations and unaccounted-for water. The data received from Europe, Oceania and Northern America were not sufficient to permit a representative analysis of conditions in the regions. For this reason, those regions are not shown in Figure 4.4.

Figure 4.4 Percentage of household connections metered, and percentage of meters replaced annually: regional means for the largest cities

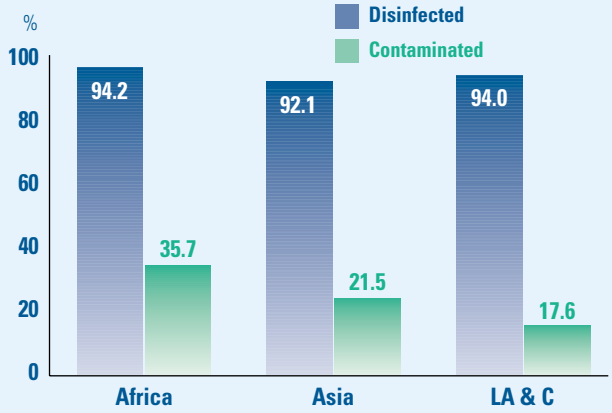


4.5 Water quality

Figure 4.5 shows two indicators of the quality of water supplied. One is the proportion of disinfected water supplied in the largest cities with a free residual chlorine greater than 0.1 mg/l. In most of the returns received the proportion was at or close to 100% The variation between regions is largely a consequence of a small number of countries, typically one or two per region, for which only a minority of the water supplies is disinfected, usually because the local authority considers it unnecessary to disinfect good quality ground water. For example, less than a quarter of the water supplied in Copenhagen (Denmark) and Ljubljana (Slovenia) is disinfected.

Figure 4.5 also shows the proportion of drinking-water samples that violated national standards with regard to microbiological, chemical, physical or aesthetic characteristics. A minority of cities reported that most samples violated a standard, but many cities stated this happened reasonably often. That so many cities were willing to admit that this occurs inspires confidence in these and other data, though the particular standards violated were not reported and may be of limited health significance.

Figure 4.5 Percentage of water supply which is effectively disinfected (free residual chlorine over 0.1 mg/l), and percentage of drinking-water quality test results that violate national standards (microbiological, chemical, physical, aesthetic)



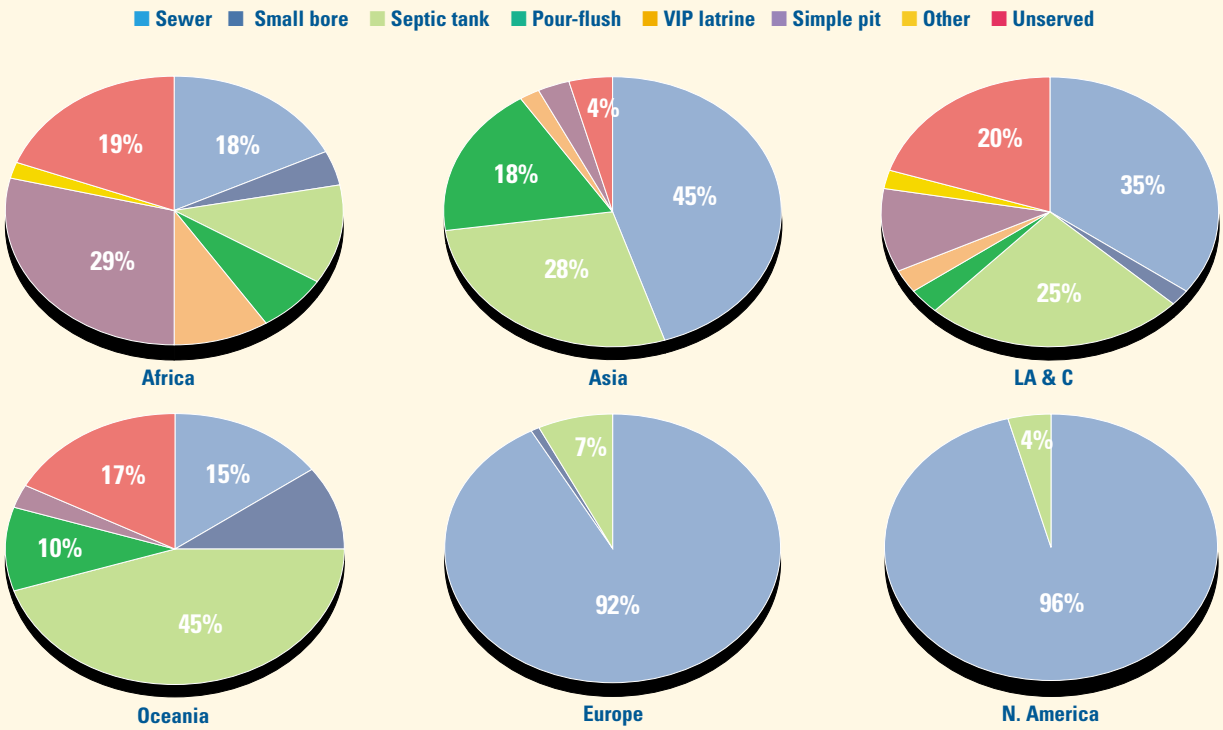
4.6 Types of sanitation facility

The types of sanitation systems available, and the proportion of the population using each, are shown in Figure 4.6.

As in the case of house connections for water supply (Chapter 2), regions where the populations of large cities are growing fastest are also those with the lowest coverage with conventional sewers. Africa and Oceania have the lowest coverage, while Latin America and the Caribbean and Asia lie between them and the industrialized regions of Europe and Northern America. Asia has done better than the other regions of the developing world in extending use of septic tanks and pour-flush systems. Septic tanks are also widely used in Oceania, where on average they serve nearly half the population of the largest cities, and in Latin America and the Caribbean, where they serve one-quarter. In the large cities of Africa, septic tanks are not as common, but a larger proportion of the population uses pit latrines, or ventilated improved pit latrines, than in other regions.

As seen in Figure 4.6, some regions rely more heavily than others on a given sanitation technology. There are certainly cities in Asia and Oceania that could make greater use of dry pit latrines, particularly in settlements where the water supply is limited, expensive or unreliable. On the other hand, in parts of Africa and in Latin America and the Caribbean there is an unexploited potential for the use of pour-flush toilets, which can give a service that is aesthetically little different from a flush toilet, at a more modest cost.

Figure 4.6 Sanitation in the largest cities: mean percentage with each type of facility, by region



5. Challenges, future needs and prospects

5.1 Future prospects

At present, sanitation coverage worldwide is still consistently lower than water supply coverage (cf. Figures 5.1 and 5.4). Rural coverage shows most disparities between regions, but is generally lower than urban coverage (cf. Figures 5.2, 5.3, 5.5 and 5.6). Globally, Asia has the lowest overall figures for coverage: almost two-thirds of those without access to improved water supply, and approximately 80% of those without access to improved sanitation, live in Asia (Figures 2.1 and 2.2). And in Africa, despite its much lower population size compared with Asia, lives almost one-third of the global population without access to improved water supply. Africa also has the lowest percentage coverage for improved water supply, with only 62% of the country's population having access (Table 5.1).

Global population projections suggest that the world population of 6.055 billion in 2000 will increase 20% to 7.105 billion by 2015, and to 7.825 billion by 2025, a 30% increase. There will be enormous strains on existing services, and substantial further service provision will be needed to meet the population increase and address the backlog.

To achieve the international development target of halving the proportion of people without access to improved sanitation or water by 2015 (Box 1.1), an additional 1.6 billion people will require access to water supply (Figure 5.1) and about 2.2 billion will require access to sanitation facilities (Figure 5.4). For water supply, that includes approximately 1.018 billion additional people to be served in urban areas (Figure 5.2) and approximately 581 million to be served in rural areas (Figure 5.3). The corresponding information for sanitation is shown in Figures 5.4–5.6. To achieve these goals will require immense effort and investment. If the change over the 1990s is used as a guide to future progress (see Section 2.2), then least progress might be expected in the area of rural sanitation.

There has been massive investment in water supply since 1980, but the health benefits have been limited by poor progress in other areas, especially in the management of human excreta. The lack of good excreta management is a cause of sickness and disease, a major environmental threat to global water resources, and a fundamental stumbling block in the advancement of human dignity.

There are many barriers to expanding access to improved sanitation services. Some are listed in Box 5.1.

The reasons for apparent low demand need to be understood, to determine whether changes can be brought about through political, financial or technical means, or simply by improving information. People may want sanitation very badly, yet be powerless to express that desire in financial or political terms. Some may want safe excreta management facilities, but not at the prevailing price. Others may not want the available "improvements" at any price.

BOX 5.1 SANITATION – BARRIERS TO PROGRESS

Barriers to progress in sanitation include:

- Lack of political will.
- Low prestige and recognition.
- Poor policy at all levels.
- Weak institutional framework.
- Inadequate and poorly used resources.
- Inappropriate approaches.
- Failure to recognize defects of current excreta management systems.
- Neglect of consumer preferences.
- Ineffective promotion and low public awareness.
- Women and children last.

Source: *(15)*

Cultural beliefs have a strong impact on sanitation, and even on the possibility of talking about sanitation. In many cultures, the handling of excreta is considered a taboo and viewed as disgusting or a dangerous nuisance, not to be discussed. No one wants to be associated with excreta. Those who reduce its offensive characteristics for others may be stigmatized by association. Problems cannot be solved if people do not want to talk about them and be associated with their solution. In many contexts, taboos – including modern technological ones – block the safe recovery of valuable agricultural resources from human wastes *(16)*. To counter the excreta taboo, education promoting sanitation and hygiene should link the value of excreta (faeces and urine) with ecology and health protection.

Three principles are fundamental to the creation of socially, economically and ecologically sustainable sanitation systems:

- **Equity. All segments of society have access to safe, appropriate sanitation systems adapted to their needs and means.**
- **Health promotion and protection from disease. Sanitation systems should prevent users and other people from contracting excreta-related diseases and should interrupt the cycle of disease transmission.**
- **Protection of the environment. Sanitation systems should neither pollute ecosystems nor deplete scarce resources *(15)*.**

Other factors to be borne in mind in implementing sanitation programmes are listed in Box 5.2. Achieving the 2015 target for sanitation will require an enormous increase in percentage coverage.

BOX 5.2 IMPLEMENTATION OF SANITATION PROGRAMMES

The implementation of effective sanitation programmes should:

- Help to prevent environmental pollution and degradation.
- Provide impetus for the development of a range of systems that are applicable to different cultural and environmental conditions.
- Treat sanitation as a major field of endeavour in its own right, with sufficient investment to revitalize training programmes and professional standing.
- Create a demand for systems that move increasingly towards safe reuse and recycling of wastewater.
- Encourage governments, nongovernmental organizations, the private sector and donors to review their sanitation policies.
- Involve in the design process people for whom the systems are being built.

Source: *(15)*

The coverage target most likely to be achieved by 2015 is that of rural water supply. This is because of the projected decline in rural populations, and the relatively high existing levels of rural water supply coverage compared with rural sanitation coverage (cf. Figures 5.3 and 5.6). Urban services face the greatest overall challenges, with more than a billion additional people needing access to both water supply (Figure 5.2) and sanitation (Figure 5.5) over the next 15 years, if coverage targets are to be met. Indeed, just to maintain the present percentage coverage in urban areas up to the year 2015, an estimated 913 million additional people will need access to water supply, and an additional 834 million will need access to sanitation. This effort is equivalent to building the water supply and sanitation infrastructure to serve approximately three times the population of Northern America.

Figure 5.1 Actual and target global water supply coverage

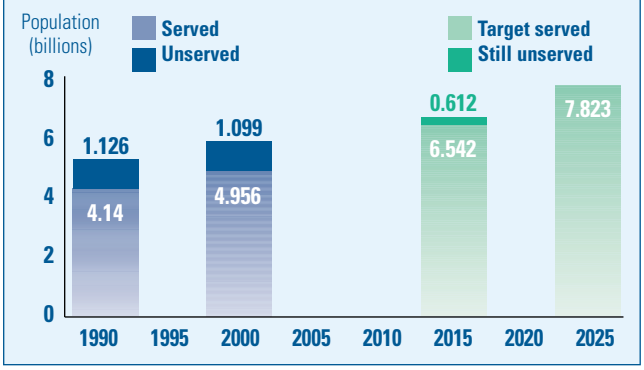


Figure 5.2 Actual and target global urban water supply coverage

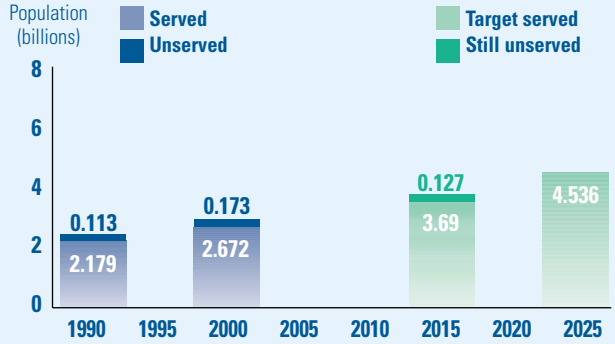


Figure 5.3 Actual and target global rural water supply coverage

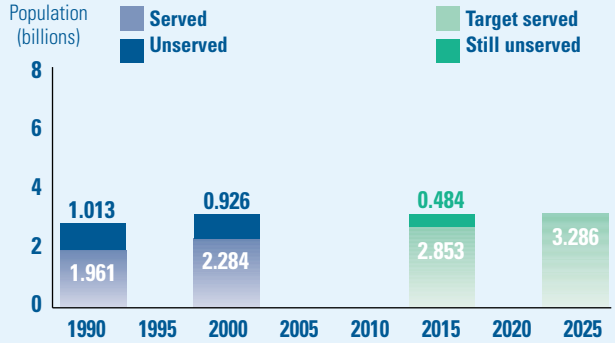


Figure 5.4 Actual and target global sanitation coverage

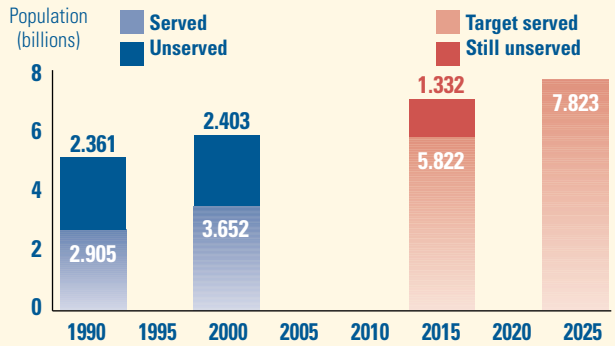


Figure 5.5 Actual and target global urban sanitation coverage

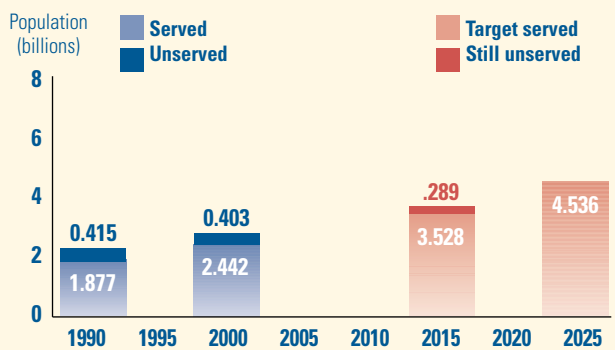
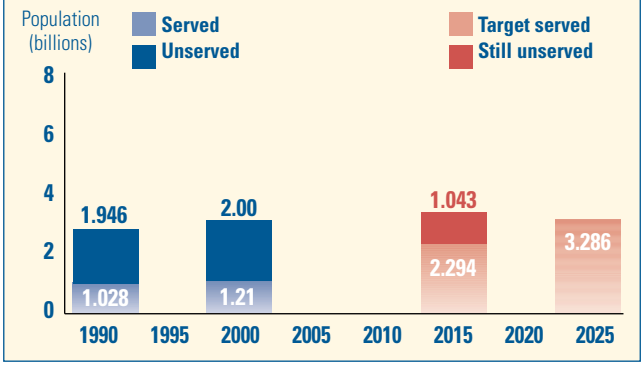


Figure 5.6 Actual and target global rural sanitation coverage



5.2 Future needs and services

There are four major challenges facing the water supply and sanitation sector in the years to come:

- Keeping pace with a net population growth of more than a billion people over the next 15 years (Box 5.3; *17*).
- Closing the coverage and service gap, with emphasis on sanitation which lags considerably behind water supply.
- Ensuring sustainability of existing and new services.
- Improving the quality of services.

The magnitude of these challenges can be seen clearly in the context of the international development targets described in Box 1.1. Whether or not these targets are realistic, they are helpful in quantifying the challenges faced by the sector in reducing the coverage gap.

Table 5.1 shows the practical implications of adopting the VISION 21 target of halving the fraction of the global population without improved sanitation and water supply by 2015 *(1)*. To allow a more detailed regional analysis of needs over the next 15 years, the VISION 21 target has been applied to regional rural and urban populations. However, this report does not imply that all regions and countries of the world should have the same target. The table has been subdivided into urban, rural and total components, each of which is further subdivided between water supply and sanitation. In Table 5.1, 2015 target water and sanitation coverages for urban, rural and total populations were obtained by halving the fraction of the population without access to improved water or sanitation, as appropriate, for each region. The "additional population to serve" figures were obtained from the corresponding differences between the target population to have access and the current 2000 population with access, for each region. This figure represents the additional population that must be served if the fraction of urban population without improved services in the region is to be halved by 2015. The assumption is that services for those who are already served will be sustained. This is optimistic, as there are still huge constraints affecting the sustainability of water supply and sanitation services, including funding limitations, insufficient cost-recovery and inadequate operation and maintenance (Section 3.1). This suggests that, in addition to the great demand for constructing new systems, there will also be a need for substantive investments in capacity building, and operation and maintenance.

BOX 5.3 POPULATION GROWTH

The world population surpassed the 6 billion mark in 1999. From 1804, when the world passed the 1 billion mark, it took 123 years to reach 2 billion people in 1927. By 1960, 33 years later, the world supported a total population of 3 billion people. Since then the world population has grown at a pace of more than a billion people every two decades. It took 14 years to reach 4 billion in 1974; 13 years to pass the 5 billion mark in 1987; and only 12 years later, by 1999, the population reached 6 billion people.

Medium population growth projections by the United Nations – taking into account the HIV/AIDS epidemic – indicate that it will take another 12 years to add one more billion to the world population, reaching 7 billion people by 2011. From then on, the population growth trend will change, increasing the time required to add an additional 1 billion people and generating an inflection point in the population growth curve. It will take 15 years to pass the 8 billion mark in 2026 and another 24 years to reach 9 billion people by the middle of the 21st century.

All population growth is expected to occur in developing nations, as developed regions are projected to see their population decrease by 6% over the next 50 years. Meanwhile, the rural population is expected to stabilize at around 3.2 billion (from 2.97 billion today), indicating that the growing population will settle in urban areas. The challenge is to provided the basic infrastructure required by nearly 2 billion people in urban areas in the developing world, while at the same time reducing the proportion of people without access to water supply and sanitation services.

Source: *(17)*

Some of the conclusions that can be drawn from Tables 5.1 and 5.2 are striking:

- To meet the 2015 development target of halving the fraction of the population without services in Africa, Asia, and Latin America and the Caribbean, the number of people served by water supply must increase by 1.6 billion (32%), and those served by sanitation must increase by 2.2 billion (59%).
- For water, this means providing services for an additional 107 million people each year, or 292 000 every day, until 2015. Considering that only 816 million people gained access to improved water services during the 1990s, the pace has to be accelerated over the next 15 years.
- For sanitation, the challenge is even greater, with services to be provided for an additional 145 million people each year until 2015, or 397 000 every day until 2015. During the 1990s, only 75 million people a year gained access to improved sanitation services.

- Rapid urban growth means that more than half of the additional services must be in urban areas, despite the higher current levels of coverage. The lower levels of service in rural areas also mean that nearly half of the improvements will need to come in rural areas, even though the rural population will grow more slowly than the urban population.
- Most of the work will be in Asia. The absolute needs in Asia outstrip those of Africa, and Latin America and the Caribbean combined. This does not mean that the needs of the poor are any more acute in Asia than elsewhere, only that the majority of people without access to water supply and sanitation services are in Asia.
- Current progress is inadequate to meet the targets. Something will have to change dramatically if the targets are to be met. In reality, as highlighted at the World Water Forum in The Hague *(1),* a wide range of issues would need to be resolved, and the majority of these are institutional and social, rather than technical.

The estimated population growth in the next 15 years is 1.1 billion people, 88% of whom will live in urban areas. After 2015, all the population expansion will be concentrated in cities. If global expenditure and approaches in water supply remain the same as during the past decade, by 2015 water supply services will be provided to an additional 739 million urban dwellers and 489 million rural inhabitants. Considering that the current urban and rural populations without improved water service are 173 million and 926 million, respectively, and that by 2015 the urban and rural populations will grow by 972 million and 127 million, respectively, it is obvious that the past pace of providing improved services will be insufficient to cope with the projected population growth. Unless the pace is increased, the number of people without access will increase sharply. To achieve the 2015 target, the annual investment in water supply should be increased by 31% (39% for the urban water sector and 19% for the rural water sector).

In sanitation, the numbers are even more dramatic as the current coverage level is low. In urban areas, 1.085 billion additional people should be provided with sanitation service, requiring a 28% increase in effective annual expenditure. In rural areas, the global target is to provide an additional 1.1 billion people with sanitation service, implying a quadrupling of the annual progress achieved over the 1990s. To achieve the total sanitation target by 2015 would require that the annual expenditures of the 1990s almost double.

TABLE 5.1 POPULATION COVERAGE REQUIRED BY THE 2015 INTERNATIONAL DEVELOPMENT TARGET

URBAN	2000 urban population (millions)	2000 urban population with access (millions)	2000 urban coverage	2015 target urban coverage	2015 urban population (millions)	2015 target urban population to have access (millions)	2015 target additional urban population to serve (millions)	2015 target increase in urban population to be served
Water supply								
Africa	297	253	85	93	501	464	210	83
Asia	1352	1254	93	96	1943	1873	619	49
Latin America and the Caribbean	391	362	93	96	504	486	123	34
Oceania	21.3	21.0	98	99	25.7	25.5	4.5	21
Europe	545	542	100	100	566	564	22	4
Northern America	239	239	100	100	278	278	396	16
Global	2845	2672	94	97	3817	3690	1018	38
Sanitation								
Africa	297	251	85	92	501	462	211	84
Asia	1352	1055	78	89	1943	1730	675	64
Latin America and the Caribbean	391	340	87	93	504	471	131	39
Oceania	21	21	99	99	25.7	25.5	4.5	21
Europe	545	537	98	99	566	561	25	5
Northern America	239	239	100	100	278	278	39	16
Global	2845	2442	86	92	3817	3528	1085	44

TABLE 5.1 POPULATION COVERAGE REQUIRED BY THE 2015 INTERNATIONAL DEVELOPMENT TARGET (CONT.)

RURAL	2000 rural population (millions)	2000 rural population with access (millions)	2000 rural coverage	2015 target rural coverage	2015 rural population (millions)	2015 target rural population to have access (millions)	2015 target additional rural population to serve (millions)	2015 target increase in rural population to be served
Water supply								
Africa	487	231	47	74	577	425	194	84
Asia	2331	1736	74	87	2404	2097	361	21
Latin America and the Caribbean	128	79	62	81	127	103	23	30
Oceania	9.1	5.7	63	81	10.4	8.5	2.8	49
Europe	184	161	87	94	154	154	0	0
Northern America	71	71	100	100	66	66	0	0
Global	3210	2284	71	85	3337	2853	581	25
Sanitation								
Africa	487	220	45	73	577	419	198	90
Asia	2331	712	31	65	2404	1569	857	120
Latin America and the Caribbean	128	62	49	74	127	94	32	51
Oceania	9.1	7.3	81	91	10.4	9.4	2.1	28
Europe	184	137	74	89	154	137	0	0
Northern America	71	71	100	100	66	66	0	0
Global	3210	1210	38	69	3337	2294	1089	90

TOTAL	2000 total population (millions)	2000 total population with access (millions)	2000 total coverage	2015 target total coverage	2015 total population (millions)	2015 target total population to have access (millions)	2015 target additional total population to serve (millions)	2015 target increase in total population to be served
Water supply								
Africa	784	484	62	82	1078	889	404	83
Asia	3683	2990	81	91	4347	3970	980	33
Latin America and the Caribbean	519	441	85	93	631	588	147	33
Oceania	30.4	26.7	88	94	36.1	33.9	7.3	27
Europe	729	703	96	100	719	718	22	2
Northern America	310	310	100	100	343	343	39	11
Global	6055	4956	82	91	7154	6542	1599	32
Sanitation								
Africa	784	471	60	82	1078	881	410	87
Asia	3683	1767	48	76	4347	3299	1532	87
Latin America and the Caribbean	519	402	78	90	631	566	163	41
Oceania	30.4	28.4	93	97	36.1	34.9	7	23
Europe	729	674	92	97	719	698	25	4
Northern America	310	310	100	100	343	343	39	11
Global	6055	3652	60	81	7154	5822	2175	59

Table 5.2 shows the urban-rural distribution of the additional population for which services must be provided to meet the 2015 international development target.

TABLE 5.2 DISTRIBUTION OF ADDITIONAL POPULATIONS TO BE SERVED TO MEET THE 2015 INTERNATIONAL DEVELOPMENT TARGET

Region	Urban %	Rural %	Total %
Water supply			
Africa	13.1	12.1	25.3
Asia	38.7	22.6	61.4
Latin America and the Caribbean	7.7	1.5	9.0
Oceania	0.3	0.2	0.5
Europe	1.4	0.0	1.4
Northern America	2.4	0.0	2.4
Totals	**63.6**	**36.4**	**100**
Sanitation			
Africa	9.7	9.1	18.8
Asia	31.0	39.4	70.6
Latin America and the Caribbean	6.0	1.5	7.4
Oceania	0.2	0.1	0.3
Europe	1.2	0.0	1.1
Northern America	1.8	0.0	1.8
Totals	**49.9**	**50.1**	**100**

5.3 Ways to face the challenges

While water, sanitation and hygiene promotion interventions are clearly linked in their effects, the problems addressed by each are fundamentally different. Water supply, sanitation and hygiene promotion require different skills and approaches, and a style that works well for one may not work for another.

To most people, and especially to the poor, the need for a convenient and safe water supply is self-evident. It is not hard to "generate demand" for drinking water supply among the poor; they already calculate the time it costs to fetch water, and are often willing to pay vendors far more than affluent families pay the public utility for superior service. There is no lack of demand for water supply among the poor or anybody else, and historically this is almost always the first priority for communities.

The current challenges in water supply involve the development of appropriate institutional, economic and financial arrangements to attract initial investment and ensure continued sustainability. These challenges are usually met through collective efforts by governments, commerce, community, or civil society; they almost always involve sharing resources (such as water treatment works or handpumps), regardless of the technology or scale of the system.

In contrast, the construction and maintenance of sanitation facilities is often an individual or household affair. In some cases, sanitation systems mirror community water supplies, with an extensive piped network in the urban environment. By and large, however, such solutions are too expensive for the people currently without service, and would require a radically improved water supply service to function. On-site sanitation (pit latrines, septic tanks, etc.) is appropriate for the unserved population in many rural areas, and is increasingly common in periurban and urban areas. On-site sanitation is, however, a household affair and its development consequently requires a different promotional approach from that required for water supply. Experience suggests that a marketing approach is needed. That is, there should be a focus on developing and distributing products that match consumer demands in both quality and price. This in turn requires understanding the reasons why people want sanitation, which may differ significantly from the agendas of national or international agencies (see Box 5.4). To be successful, sanitation programmes need to provide education for behavioural change and to ensure community participation. Because of high levels of illiteracy, conventional training methods may be ineffective. Many local projects are not achieving the expected results because of a failure to provide effective education.

BOX 5.4 WHY PEOPLE WANT LATRINES

A survey of rural households in the Philippines elicited the following reasons for satisfaction with a new latrine. The reasons are listed in order of importance, starting with the most important:

- lack of flies;
- cleaner surroundings;
- privacy;
- less embarrassment when friends visit;
- reduced gastrointestinal disease.

These results are echoed in other parts of the world. Candid personal reflection, even by health sector professionals, often reveals that health is a less intense motivator for sanitation than dignity, convenience and social status.

Source: *(7)*

The importance of hygiene (the behaviour of individuals in the management of excreta and cleanliness) has only recently returned to the fore in the sector. Concerns about hygiene and the use, rather than simply the construction of latrines are not new. What is new, is the rapid increase in epidemiological evidence pointing to the importance of relatively small behavioural changes in protecting families from faecal-oral disease (reviewed in 17).

There is an increasing consensus that much of the health benefit of water supply and sanitation comes from the changes in hygiene they promote. People wash more often when water taps are conveniently located on their property, and people are more likely to practise safe excreta disposal when there is a nearby latrine. Yet other practices, such as handwashing with soap and preventing contamination of drinking-water, are also important, and these behaviour changes do not come about automatically through the provision of hardware. Promoting and motivating people to make these changes requires skills that differ from those required to develop and manage an effective water supply system, or to promote a successful sanitation facilities programme.

Ironically, while epidemiologists agree about the importance of

hygiene improvement for health protection, it is at present often not well understood and is not sufficiently documented. None of the data presented in this report directly describes or reflects hygiene practices. While the observation of hygiene behaviour has become an increasingly well-documented field *(e.g. 18),* these observations are not routinely included as a component of household surveys.

From the above, it is clear that water supply, sanitation and hygiene are not simply "collective goods," but rather affect each person as an individual. This means that progress in the sector requires a focus on results at the household level. The need to focus on household results is precisely why the use of household survey data in this report is so important. A focus on the household has been recognized as critical in sanitation and environmental health *(19).* In setting priorities, and establishing "next moves" to improve services, the question must always be: "How does this affect the individual household?" The household-centred approach is not merely an evaluation method. As the data in this report show, individual households are the primary actors in the extension of sanitation coverage – sometimes even without the knowledge of the formal "provider" agencies. To build on household capacities and initiative, there must also be a household-centred approach to implementation.

Access to house connections for water supply and sewerage, handpumps or latrines is not random. Overwhelmingly, those currently not served by improved water supply and sanitation are the poor and powerless. Not surprisingly, public health statistics for water-related and sanitation-related disease also vary with income, leading to the painful conclusion of Hardoy, Cairncross & Satterthwaite *(20)* that the poor die young. The relationships between health and services are complex, and involve many other factors besides simple access to environmental services; but bad water supply and sanitation certainly contribute to the cycle of disease, poverty and powerlessness. Interventions in water supply and sanitation, through their impact on health and development, are powerful elements of efforts to enable the poor to escape poverty.

Even among the relatively powerless, those with the least power suffer the most. Children and women are the most affected by failures in water supply, sanitation and hygiene promotion. The major portion of the burden of death and disease falls upon children under five years of age; the major burden of care falls upon the mothers, although they may not be explicitly targeted with messages such as the need for safe disposal of stools from children under five. Similarly, there are 40 million refugees and 100 million people displaced from their homes within their own countries as a result of disaster, civil war and conflict. These populations face problems with water supply and sanitation that they may already have solved in their own homes.

Despite the grim statistics of inadequate coverage presented in Chapter 2, this report also reflects the tremendous capacity of society to solve these problems. Simply maintaining a given percentage of coverage often reflects extensive mobilization of skills and resources to keep pace with population growth. Although considerable resources are being provided by external agencies to the water supply and sanitation sector, these are still insufficient. While sanitation coverage in rural India is still far too low, planners were shocked when they first recognized the significance of individual and household investment. Government-funded sanitation could only reach 2% of the population in the 1980s, but household surveys revealed that four times as many households had made the decision to invest in basic sanitation themselves without government assistance. This suggests that governments and external support agencies, including nongovernmental organizations and the private sector, need to understand how water supply and sanitation improvements actually come about; how their activities can help or hinder the process; and need to learn how to work with that.

According to information provided by governments to this Assessment about US$ 16 billion have been spent annually in constructing new water and sanitation facilities over the past 10 years. Yet at the end of the 10 years, huge numbers of people are still without services. In contrast, US $11 billion is spent each year in Europe on ice cream, US $17 billion is spent each year in Europe and the United States on pet food, and US $105 billion is spent each year in Europe alone on alcoholic drinks *(15).* National budgets for armaments are also large. Water supply, sanitation and hygiene are low-cost essentials compared with these items. It should not be beyond human capacity to achieve a safe, reliable water supply, and sanitation and hygiene for all.

Lack of water supply, sanitation and hygiene causes both social and individual problems. There is increasing consensus that solutions are only achieved in a local context, in which the appropriate mix of government, private sector, individual and civil society contributions must be locally appropriate; that all sectors have a part to play; and that the part must be locally determined. In contrast, much of the debate during the 1990s focused upon the limits of governmental capacity to provide water supply and sanitation services. Some have seen the private sector or civil society (led by nongovernmental organizations or the community itself) as the preferred provider of the services that government could not provide in a more efficient and more accountable way. The evidence is only now beginning to trickle in and the results are mixed.

For example, preliminary studies show that multinational companies are playing an increasing role in water supply in developing countries, and it is plausible that the private sector outlook promotes greater efficiency. These same studies suggest, however, that multinationals are not necessarily bringing much new capital investment to the sector. In any discharge of responsibility from the public to the private sector, care must always be taken to ensure that enforceable regulatory, contractual mechanisms are in place to meet public objectives, and to provide the private sector with sufficient stability to attract continuing investment in extending and upgrading service. Without such mechanisms, it is unrealistic to expect the private sector to invest in services and not maximize their return or investment. Similarly, field studies have suggested that community-managed systems are not necessarily more effective or fairer than systems run by traditional government agencies.

Much of the rhetoric on both sides of the public-private debate has been confused because it does not always consider the full diversity of the private sector. While large multinational water companies are significant players, many other players are much smaller in size. These include local water vendors, contractors and masons who build latrines. While none of these smaller actors may bring in large amounts of capital, all can have a direct impact upon the quantity and quality of services provided.

5.4 Sustaining the solutions

This section considers how solutions can be sustained in institutional, financial and natural resource terms. Sustainable development has been usefully defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" *(21)*. While many aspects of sustainability have been explored by a number of authors, there are two principal ones of concern to hygiene, sanitation and water supply:

- **Functional sustainability.** Can the institutions and finances carry on long after the initial excitement of system inauguration? Or will the system collapse into disuse because essential funds or skills for operation and maintenance cannot be found?
- **Environmental sustainability.** Will system operation damage the environment (and thereby health and prosperity) for future generations? Will other environmental changes damage the water resource to the point where future services become difficult or impossible to maintain?

These questions are explored in greater detail below, starting with issues of functional sustainability. Some of the factors with implications for the sustainability of water supply and sanitation systems are examined in Box 5.5.

BOX 5.5 SUSTAINABLE WATER SUPPLY AND SANITATION SYSTEMS

A series of meetings across Africa led to the conclusion that important factors determining the sustainability of water supply and sanitation projects included:

- Community participation in all stages of project planning, design, implementation, management and operation, with consideration of gender issues.
- Political commitment.
- Intersectoral coordination, collaboration and cooperation.
- Adequate institutional frameworks.
- Human resources development in all its forms and at all levels.
- Self-improvement of communities.
- Better hygiene and sanitation.
- Improved information management.
- Improved environmental sanitation in communities.
- Use of appropriate technologies.
- Involvement of the private sector through sound regulatory and controlling mechanisms.

Source: *(22)*

One of the hardest lessons for the water supply and sanitation sector is that making the initial capital investment is often the easiest part of the job. It is often relatively easy to find the resources (money, labour, materials and organization) for one big push to build something. It is, however, much more difficult to maintain a truly sustainable system. A number of principles illustrate this point (see Box 5.6).

BOX 5.6 SUSTAINING OPERATION AND MAINTENANCE THROUGH GOOD RESOURCE MANAGEMENT

At the beginning of the 1990s, following an extensive consultation process, the Operation and Maintenance Working Group established crucial principles that were aimed at improving the sustainability of water supply and sanitation services. They are:

- The provision of safe water is a service and requires a service-orientated attitude on the part of the agencies involved. Water should be managed as a commodity: its use should be financially sound, but subject to legal and regulatory controls to ensure its conservation, protection and well-balanced use.
- Water and sanitation services should normally be set at a level that users are willing to finance, operate and maintain.
- Water supply and sanitation systems should be managed and operated in accordance with the principles of good business practice. The form of management will vary according to the local situation. The agency should adopt an open policy and be fully accountable to its customers.

The Working Group also considered that governments should have a legitimate concern to satisfy the basic needs of disadvantaged segments of their population, and may require agencies to provide services through special financial arrangements, possibly on a temporary basis, to promote public health and economic development.

Source: *(23)*

No service is sustainable in the long run if its costs cannot be recovered; to the extent that recurrent costs are subsidized directly by the state, the system's users are hostage to political whim. On the other hand, this does not mean that all users must necessarily pay the same share of the cost, or even that the cost of each user's services must be recovered from that individual user. In practice, some degree of cross-subsidy is inevitable due to the complexity of calculating the costs of individual household service. More importantly, some degree of cross-subsidy from wealthier to poorer users is desirable to ensure access for all, and thus minimize disease and maximize public health benefits.

Institutional sustainability and the mobilization of individual resources for water supply and sanitation depend upon the existence of a reliable and fair legal framework. The enormous energy that individuals and families can mobilize for water supply and sanitation depends greatly upon the security of their future. No family will invest in sanitation if they will not benefit from it; for example, if they fear eviction. Similarly, the problem of groundwater depletion in south Asia and other parts of the world has much to do with poorly defined property rights between drinking-water consumers and those who irrigate agricultural fields. These examples are symptoms of the overall complexity of many aspects of water-related law and regulation.

There has been increasing recognition of the need to treat water as vulnerable and scarce resource, especially since the Dublin conference *(24)*. Domestic water supply plays a small role in the water balance of most countries, and water consumption for irrigation often exceeds domestic consumption by a factor of ten or twenty. Uncontrolled irrigation, on the other hand, can play a major role in eroding the sustainability of domestic water supply. This is apparent in parts of south Asia, where the water table in some areas has dropped dramatically because of overpumping for heavily subsidized irrigation. As the water table drops, domestic water wells and boreholes dry up and water supplies fall into disuse. In other areas, exploitation of relatively good quality groundwater for irrigation may occur alongside expensive treatment of contaminated surface water for domestic supply. Resolution of this type of conflict has lead to the recognition that integrated management approaches are important, particularly integrated water resource management.

5.5 Need for monitoring

The use of household surveys in the Assessment 2000 greatly improved our understanding of coverage. But coverage statistics are only part of the story, and the assessment questionnaires sent out to country representatives illustrated many other issues: institutional relations, cost, intermittency of water supply and so on. More work is therefore needed to develop and apply indicators and techniques to help clarify the current situation. While national statistics are helpful to national planners and international agencies, they are of limited value in setting priorities for practical action. For this, a more local picture is crucial and this picture cannot be built up from simple coverage statistics.

Ideas about monitoring and assessment have developed significantly during the 1990s. The routine collection of data for possible use only by a distant project manager or official is no longer considered adequate, and it is increasingly recognized that monitoring needs to be designed and implemented with a view to answering specific practical questions. Shordt *(25)* noted four important developments in thinking about monitoring for water supply and sanitation:

- More groups and stakeholders have been brought into the processes of data collection, analysis, interpretation and use.
- There is an increased emphasis on monitoring behavioural change.
- With the development of participatory appraisal and qualitative research techniques, a wider range of strategies, and measurement tools to support the strategies, has emerged.
- There is increased emphasis on the timely use of results of monitoring and evaluation.

Box 5.7 illustrates some of the questions that can be answered through better sector monitoring. While some of the data from assessment questionnaires sent to country authorities make an important start on a number of these issues, more objective information is needed. As with coverage, it will be important to validate these results from a household perspective.

The questions listed in Box 5.7 are important not just for a formal regulated system, but also for the informal systems used more frequently by the poor and most vulnerable. Finding indicators or techniques with which to answer the questions in Box 5.7 is challenging, however. Many of these questions can be answered only by the providers of services (concerned ministries, national water supply and sanitation agencies, water authorities, local services), whereas others would be more reliably obtained through population-based surveys. Such surveys are increasingly conducted at the country level and are extremely useful for determining water supply and sanitation statistics. But there are still huge problems concerning comparability of core data, uniformity of indicators and their definition, and concentration of surveys in some regions or countries.

An important challenge lies in building and sustaining the capacity to monitor progress, and to use the results of monitoring, in these areas. This challenge is already being addressed by the African Water Utilities Partnership in its work on the development of benchmarking and performance indicators (Box 5.8). While benchmarking statistics are helpful for the utility, other work must be done at the household and community level, and will require training of skilled people. Fortunately, training in such techniques will pay off for other sectors in development, as many face similar issues of assessing and monitoring sustainability.

BOX 5.7 ISSUES TO ADDRESS WITH IMPROVED SECTOR MONITORING

Water supply

- ***Equity*** What portions of the city or district are not served at all? What portions of a city's population pay what charges to private vendors selling water obtained from the utility? How are intermittency and hours of service distributed across the city? In rural areas, do different socioeconomic groups have different access to wells or taps?
- ***Quality of service*** What is the type of access to water supply and sanitation services? What type of technology is used? How effective are the services provided through these technologies? What is the quantity of water used per person a day? How clean and safe is the water at the point of distribution? How safe is it at the point of consumption? What are the water quality parameters of greatest concern to the consumer, and how can progress in improving these be gauged?
- ***Sustainability*** How sound is the physical, institutional, financial and environmental basis of the water supply? Are there short-, mid- or long-term threats to its functioning in terms of physical, institutional or financial constraints? How effective and realistic are plans for cost recovery? Are capital costs and operation and maintenance costs affordable?
- ***Efficiency*** How efficient are the services? What proportion of the time is the water supply out of service? For what fraction of the population? How predictable is down-time? Can consumers plan around it? In piped systems, what are the amounts of physical and non-physical (apparent) losses?

Sanitation

- ***Use*** Sanitation facilities are a means to an end, and not ends in themselves. Are sanitation facilities used? By whom? Are there differences by age and gender? As young children are the most likely to be infected and also the most vulnerable, safe disposal of children's stools is critical. Does the population always use toilets, or are there frequently conditions under which no suitable sanitation is available?
- ***Ultimate disposal*** It all has to go somewhere, so where does it go? Is sewage treated before discharge? How are latrine contents removed, and where do they go? Are the contents biologically safe at the time of removal?
- ***Sustainability*** How sound is the physical, institutional, financial and environmental basis of the sanitation system? Are there short-, mid- or long-term threats to its functioning? How effective and realistic are plans for cost recovery? What is the level of pollution originated by the treatment and disposal system?

Hygiene

- ***Behaviour*** Are hands washed after use of the toilet? Is soap or another aid used when hands are washed? (The use of soap, earth or mud with water has a dramatic effect on the effectiveness of transmission control.)

BOX 5.8 PERFORMANCE INDICATORS FOR AFRICAN WATER SUPPLY AND SANITATION UTILITIES[1]

Twenty-one water and sanitation utilities in Africa participated in a project assessing key performance indicators. The project is managed by the Water Utility Partnership and the intention is to extend the programme to all utilities. The data will be used as a management tool for enhancing the performance of the utilities. The indicators measured and the range of some results were:

1. Source of water.
2. Annual water production (14 – 967 million m^3).
3. Service coverage (7 – 100%).
4. Per capita production.
5. Per capita consumption (41 – 217 l/day).
6. Average domestic consumption.
7. Unaccounted for water (10% – 59%).
8. Hours per day of service (10 – 24).
9. Average tariff (8 – 402 US cents/m^3).
10. Working ratio.
11. Collection efficiency (6 – 115%).
12. Staff per 1000 connections (4 – 45).
13. Unit production cost (5 – 101 US cents/m^3).
14. Personnel cost.
15. Distribution of production costs.

Key lessons learned from the programme:

- Many utilities have difficulty in collecting and maintaining records related to the performance indicators.
- The quality of the data need to be cross-checked, as many of the utilities are not happy with the quality of their own data.
- There is a need to address concerns among utilities that they are providing confidential information which may be made public.
- There is a slow response to questionnaires and evidence of lack of commitment on the part of some utilities.

[1]The benchmarking programme promoted by the World Bank has a larger spectrum and includes indicators not presented in this box. For additional information visit: http://www.worldbank.org/html/fpd/water/topics/benchnetwork.html

Source: *(26)*

6. Africa

This chapter presents water supply and sanitation coverage data for Africa. Urban and rural water and sanitation coverage figures are shown by country, area or territory for both 1990 and 2000. Maps of current coverage are also presented. Graphs illustrate the regional changes in coverage over time, as well as coverage targets associated with projected changes in population.

6.1 Overview

Africa has the lowest total water supply coverage of any region, with only 62% of the population having access to improved water supply. This figure is based on estimates from countries that represent approximately 96% of Africa's total population. The situation is much worse in rural areas, where coverage is only 47%, compared with 85% coverage in urban areas. Sanitation coverage in Africa also is poor, with only Asia having lower coverage levels. Currently, only 60% of the total population in Africa has sanitation coverage, with coverage varying from 84% in urban areas to 45% in rural areas.

In global terms, the continent contains 28% of the world's population without access to improved water supply (Figure 2.1). It also contains 13% of people without access to improved sanitation worldwide (Figure 2.2). It is predicted that Africa will face increased population growth over the coming decades, with the greatest increase coming in urban areas. As a result, approximately 210 million people in urban areas will need to be provided with access to water supply services, and 211 million people with sanitation services, if the international coverage targets for 2015 are to be met. A similar number of people in rural areas will also need to gain access (see Table 5.1). Given the Assessment's findings concerning change in coverage over the 1990s, it appears that future needs for rural services may continue to be the most difficult to meet.

6.2 Water supply and sanitation coverage

Table 6.1 provides data for the years 1990 and 2000, and composite coverage data are presented in Maps 6.1 and 6.2. Figures 6.1 and 6.2 show urban and rural coverage in 1990 and 2000 for water supply and sanitation, respectively.

TABLE 6.1 AFRICA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000

	Year	Total population[1] (thousands)	Urban population (thousands)	Rural population (thousands)	% urban water supply coverage	% rural water supply coverage	% total water supply coverage	% urban sanitation coverage	% rural sanitation coverage	% total sanitation coverage
Algeria	1990	24 936	13 074	11 862						
	2000	31 471	18 969	12 502	98	88	94	90	47	73
Angola	1990	9 231	2 546	6 685						
	2000	12 878	4 404	8 474	34	40	38	70	30	44
Benin	1990	4 660	1 607	3 053				46	6	20
	2000	6 097	2 577	3 520	74	55	63	46	6	23
Botswana	1990	1 276	530	746	100	91	95	84	44	61
	2000	1 622	815	807	100					
Burkina Faso	1990	9 061	1 229	7 832	74	50	53	88	14	24
	2000	11 937	2 204	9 733	84			88	16	29
Burundi	1990	5 456	342	5 114	94	63	65	67	90	89
	2000	6 695	600	6 095	96			79		
Cameroon	1990	11 472	4 622	6 850	76	36	52	99	79	87
	2000	15 085	7 379	7 706	82	42	62	99	85	92
Cape Verde	1990	342	151	191						
	2000	428	266	162	64	89	74	95	32	71
Central African Republic	1990	2 943	1 103	1 840	80	46	59	43	23	30
	2000	3 615	1 489	2 126	80	46	60	43	23	31
Chad	1990	5 745	1 209	4 536				70	4	18
	2000	7 651	1 820	5 831	31	26	27	81	13	29
Comoros	1990	527	147	380	97	84	88	98	98	98
	2000	695	231	464	98	95	96	98	98	98
Congo	1990	2 219	1 184	1 035						
	2000	2 944	1 841	1 103	71	17	51	14		
Côte d'Ivoire	1990	11 635	4 690	6 945	89	49	65	78	30	49
	2000	14 786	6 854	7 932	90	65	77			
Democratic Republic of the Congo	1990	37 364	10 442	26 922						
	2000	51 655	15 641	36 014	89	26	45	53	6	20
Djibouti	1990	517	415	102						
	2000	637	531	106	100	100	100	99	50	91
Egypt	1990	56 333	24 841	31 492	97	91	94	96	80	87
	2000	68 469	30 954	37 515	96	94	95	98	91	94

TABLE 6.1 AFRICA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000 (CONT)

Equatorial Guinea	1990	352	126	226						
	2000	452	218	234	45	42	43	60	46	53
Eritrea	1990	2 888	456	2 432						
	2000	3 851	722	3 129	63	42	46	66	1	13
Ethiopia	1990	48 092	6 461	41 631	77	13	22	58	6	13
	2000	62 565	11 042	51 523	77	13	24	58	6	15
Gabon	1990	935	637	298						
	2000	1 226	998	228	73	55	70	25	4	21
Gambia	1990	921	237	684						
	2000	1 306	424	882	80	53	62	41	35	37
Ghana	1990	15 128	5 124	10 004	83	43	56	59	61	60
	2000	20 213	7 753	12 460	87	49	64	62	64	63
Guinea	1990	5 755	1 477	4 278	72	36	45	94	41	55
	2000	7 430	2 435	4 995	72	36	48	94	41	58
Guinea-Bissau	1990	973	195	778						
	2000	1 213	288	925	29	55	49	88	34	47
Kenya	1990	23 552	5 671	17 881	89	25	40	94	81	84
	2000	30 080	9 957	20 123	87	31	49	96	81	86
Lesotho	1990	1 722	346	1 376						
	2000	2 153	602	1 551	98	88	91	93	92	92
Liberia	1990	2 579	1 083	1 496						
	2000	3 154	1 416	1 738						
Libyan Arab Jamahiriya	1990	4 416	3 614	802	72	68	71	97	96	97
	2000	5 604	4 911	693	72	68	72	97	96	97
Madagascar	1990	11 632	2 735	8 897	85	31	44	70	25	36
	2000	15 942	4 721	11 221	85	31	47	70	30	42
Malawi	1990	9 335	1 242	8 093	90	43	49	96	70	73
	2000	10 925	2 723	8 202	95	44	57	96	70	77
Mali	1990	8 843	2 105	6 738	65	52	55	95	62	70
	2000	11 234	3 375	7 859	74	61	65	93	58	69
Mauritania	1990	2 026	881	1 145	34	40	37	44	19	30
	2000	2 669	1 541	1 128	34	40	37	44	19	33
Mauritius	1990	1 057	428	629	100	100	100	100	100	100
	2000	1 158	478	680	100	100	100	100	99	99
Morocco	1990	23 932	11 543	12 389	94	58	75	95	31	62
	2000	28 350	15 902	12 448	100	58	82	100	42	75
Mozambique	1990	14 198	3 781	10 417						
	2000	19 681	7 917	11 764	86	43	60	69	26	43
Namibia	1990	1 350	359	991	98	63	72	84	14	33
	2000	1 726	533	1 193	100	67	77	96	17	41
Niger	1990	7 732	1 245	6 487	65	51	53	71	4	15
	2000	10 730	2 207	8 523	70	56	59	79	5	20
Nigeria	1990	87 030	30 470	56 560	78	33	49	77	51	60
	2000	111 506	49 050	62 456	81	39	57	85	45	63
Réunion	1990	604	386	218						
	2000	700	496	204						
Rwanda	1990	6 987	372	6 615						
	2000	7 733	476	7 257	60	40	41	12	8	8
Saint Helena	1990	6	3	3						
	2000	6	4	2						
Sao Tome and Principe	1990	119	46	73						
	2000	147	69	78						
Senegal	1990	7 327	2 933	4 394	90	60	72	86	38	57
	2000	9 481	4 498	4 983	92	65	78	94	48	70
Seychelles	1990	69	37	32						
	2000	77	49	28						
Sierra Leone	1990	3 994	1 198	2 796						
	2000	4 855	1 779	3 076	23	31	28	23	31	28
Somalia	1990	7 773	1 882	5 891						
	2000	10 097	2 776	7 321						
South Africa	1990	34 012	16 609	17 403						
	2000	40 377	20 330	20 047	92	80	86	99	73	86
Sudan	1990	24 062	6 405	17 657	86	60	67	87	48	58
	2000	29 490	10 652	18 838	86	69	75	87	48	62
Swaziland	1990	753	179	574						
	2000	1 008	266	742						

TABLE 6.1 AFRICA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000 (CONT)

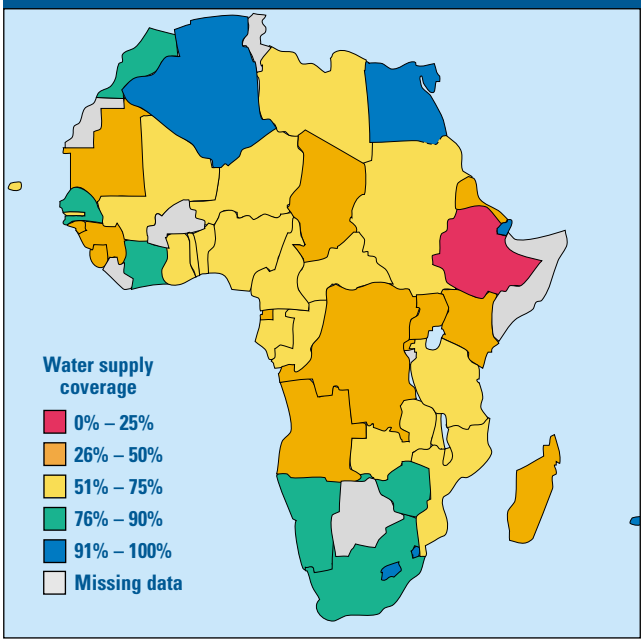
Togo	1990	3 512	999	2 513	82	38	51	71	24	37
	2000	4 629	1 540	3 089	85	38	54	69	17	34
Tunisia	1990	8 156	4 726	3 430	94	61	80	97	48	76
	2000	9 586	6 281	3 305						
Uganda	1990	16 457	1 837	14 620	80	40	44	96	82	84
	2000	21 778	3 083	18 695	72	46	50	96	72	75
United Republic of Tanzania	1990	25 470	5 298	20 172	80	42	50	97	86	88
	2000	33 517	11 021	22 496	80	42	54	98	86	90
Western Sahara	1990	206	181	25	89					
	2000	294	280	14						
Zambia	1990	7 239	2 853	4 386	88	28	52	86	48	63
	2000	9 169	3 632	5 537	88	48	64	99	64	78
Zimbabwe	1990	9 863	2 799	7 064	99	68	77	98	51	64
	2000	11 669	4 121	7 548	100	77	85	99	51	68

[1]Source: *(10)*

Maps 6.1 and 6.2, which are based on Table 6.1, show how few countries in Africa have either water supply or sanitation coverage of more than 90%. Indeed, almost half of all the countries for which there are data have less than 50% coverage for sanitation. Even for water supply there are relatively few countries with more than 75% total water coverage.

Ten African countries have less than 50% coverage for both their current national water supply and sanitation coverage. These countries are Angola, Burkina Faso, Chad, the Democratic Republic of the Congo, Eritrea, Ethiopia, Madagascar, Mauritania, Rwanda and Sierra Leone.

MAP 6.1 AFRICA: WATER SUPPLY COVERAGE, 2000



MAP 6.2 AFRICA: SANITATION COVERAGE, 2000

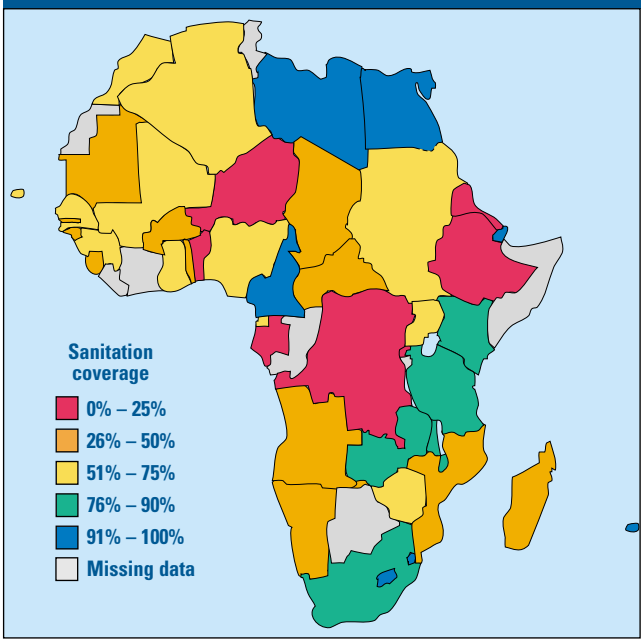


Figure 6.1 Africa: water supply coverage, 1990 and 2000

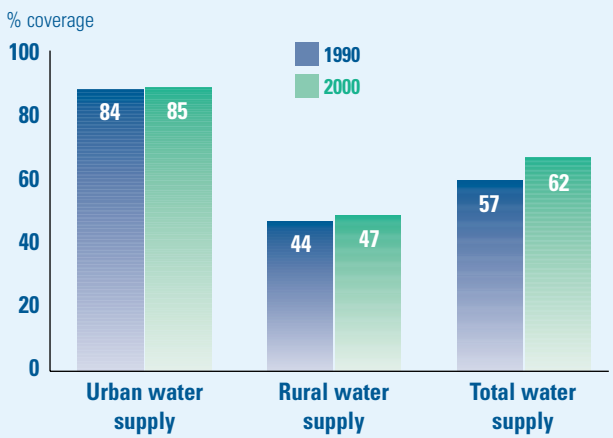
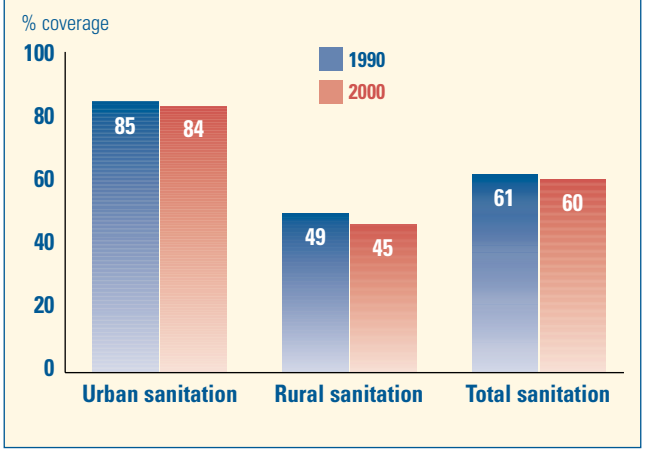


Figure 6.2 Africa: sanitation coverage, 1990 and 2000



6.3 Changes during the 1990s

The changes in water supply and sanitation coverage over the 1990s for urban and rural areas are shown in Figures 6.1 and 6.2.

The graphs suggest that urban services have remained more or less the same over the 1990s. Rural services, however, tell a different story. Rural water supply increased slightly while rural sanitation has fallen. Overall, water coverage is moderately higher in the year 2000 than it was in 1990, while sanitation coverage has fallen slightly over the same period. These findings should be considered cautiously, as data for three large countries (Algeria, the Democratic Republic of the Congo and South Africa) are only available for the year 2000 and have an effect on the totals for Africa.

6.4 Trends and future needs

In addition to presenting the changes over the 1990s in the number of people with and without access to improved services, Figures 6.3–6.8 also show the international development targets applied to population projections. The year 2015 targets are to reduce the proportion of people without access to improved water and sanitation by one-half, and to achieve universal coverage by the year 2025.

The graphs show that the total number of people in the region with access to water supply has increased considerably over the 1990s. For example, the data show that 135 million people in Africa gained access to improved water supply between 1990–2000 (Figure 6.3). The majority of these people (87 million) were in urban areas (Figure 6.4). For sanitation, the increase in numbers of people with access has been smaller than that for water coverage. In total, 98 million additional people gained access to improved sanitation services between 1990–2000 (Figure 6.6), with the vast majority of these (84 million) living in urban areas (cf. Figures 6.7, 6.8).

Figures 6.3–6.8 also indicate population projections and targets. The African population is expected to increase by 65% over the next 25 years. This presents a huge challenge to services in the region. To achieve the year 2015 goal for urban water supply coverage – halving the percentage of those without access – an additional 210 million people over the next 15 years will have to be provided with service. In rural areas, an estimated additional 194 million people will need to have access to meet the target. Therefore, a total of approximately 400 million additional people will need to be provided with access to improved water supply to meet the 2015 target. Given the findings of the Assessment 2000, this will require a tripling of the rate at which additional people have been gaining access between 1990–2000. New approaches will be needed to face this challenge. Some of the approaches being taken, as well as the difficulties faced by one country, are given in Box 6.1. Box 6.2 also describes some promising new approaches.

To meet the 2015 target for sanitation, an additional 211 million people in urban areas and 194 million people in rural areas will need to be provided with access. This will require that four times as many additional people gain access to improved sanitation between now and 2015, as additionally gained access between 1990–2000.

BOX 6.1 IMPROVING ACCESS TO SAFE DRINKING-WATER IN THE UNITED REPUBLIC OF TANZANIA

The water available in the United Republic of Tanzania should be more than adequate for the population's needs. Parts of the Great Lakes Victoria, Tanganyika and Nyasa lie within the country, and there are five major river systems which are used to generate over 85% of the country's power. Yet overall water supply coverage is estimated at 42% in rural areas and 80% in urban areas. The day-to-day experience of many Tanzanians is of intermittent operation, breakdowns, droughts and poor water quality.

Developing some of the potential water sources is, however, problematic. The Great Lakes are international bodies of water, and their exploitation as water sources for the United Republic of Tanzania needs to be handled with delicacy. In the dry central region of the country, groundwater is found only at considerable depth, requiring substantial investment. Surface waters often have competing demands: water is needed for irrigation, hydroelectric power and industry, as well as for domestic use.

Even the water available for domestic use does not always reach the household, because of breakdowns, leakage, lack of finance or management problems. In Dar es Salaam, at least 35% of the water supposedly supplied to the city's inhabitants is lost in the distribution system through leaking pipes and illegal connections, particularly along the transmission main where water is illegally tapped for irrigation. In the Njombe district villages of Ilunda and Ihero, which are counted as covered, water is rationed and is only available from the village standpipe for two hours per day, because the diesel engine used to pump water to the storage tank breaks down.

In response to these difficulties, a new approach is being taken that is demand-responsive rather than supply-driven. Communities take the lead in determining how they wish to solve their water problems and then demand the assistance to do so. Delivery of services is increasingly through the private sector, with the government providing regulation and coordination.

Source: *(27)*

BOX 6.2 BETTER MANAGEMENT IN ZAMBIA LEADS TO INCREASED ACCESS TO WATER SUPPLY

The Zambia handpump programme is intended to provide a piped water supply over large areas of the country. Initially, the borehole construction specifications called for large diameters and high yields. A contract was awarded for each borehole, which took from one to two weeks to drill and cost US$ 5000.

A series of technical and administrative innovations have recently been made, including the following:

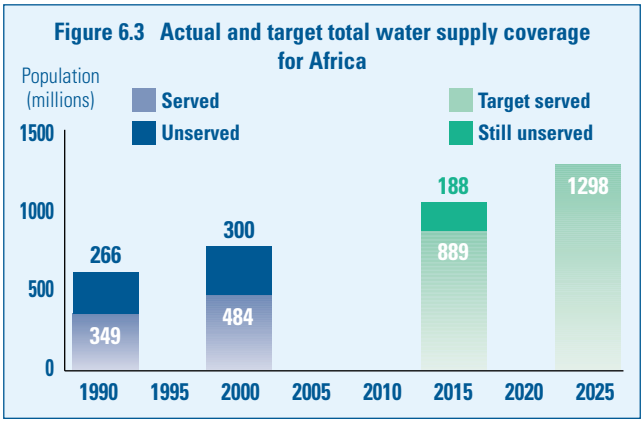
- Specifications have been reduced.
- Hydrological survey and drilling are contracted in an integrated manner.
- More mobile rigs are being used.
- Contractors are paid per unit task completed.
- No payments are made to drillers whose boreholes yield no water.

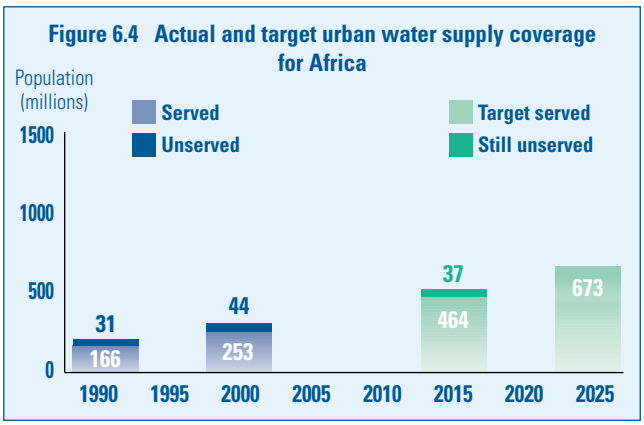
The innovations have resulted in striking improvements:

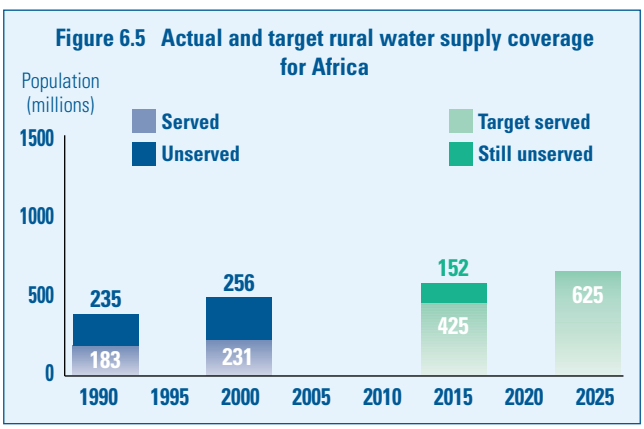
- Drilling time has been reduced to less than two days.
- The drilling costs per borehole have fallen to under US$ 2600.
- Project completion rates have gone up.
- More boreholes are being drilled.

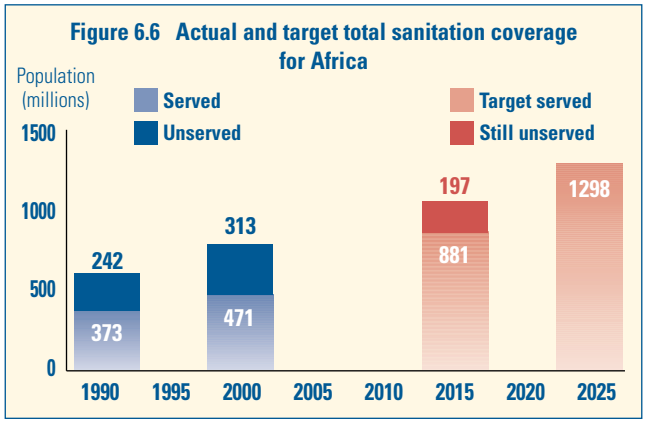
Water and sanitation committees have been formed at water points and local communities have been trained in the use and maintenance of pumps. Water point users pay token fees, which are used to maintain the pumps.

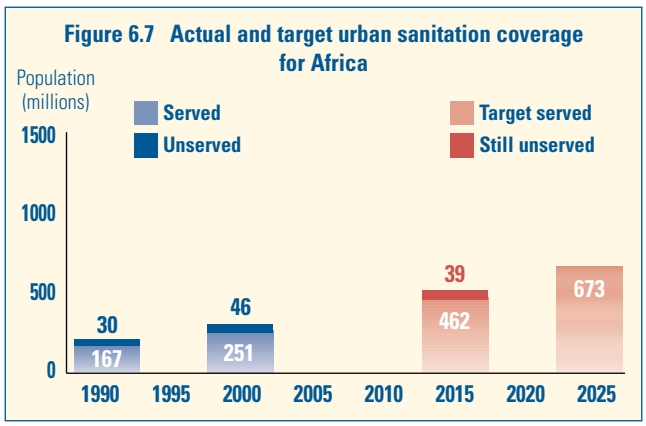
Source: *(28)*

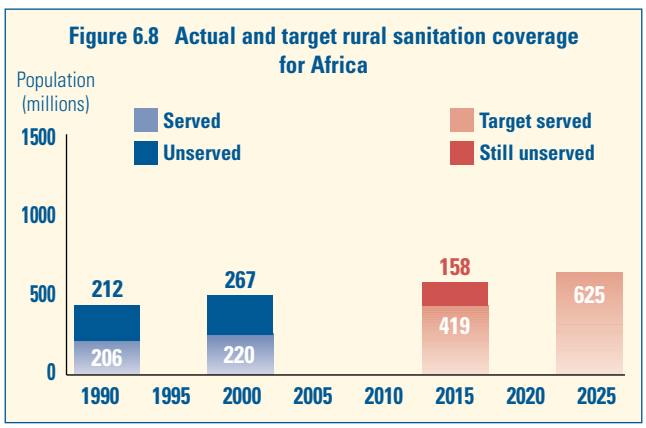












7. Asia

This chapter presents water supply and sanitation coverage data for Asia. Urban and rural water supply and sanitation coverage figures are shown by country, area or territory for both 1990 and 2000. Maps of current coverage are also presented. Graphs illustrate regional changes in coverage over time, as well as coverage targets associated with projected changes in population.

7.1 Overview

Data representing 94% of the Asian population suggest that only 48% of the population has sanitation coverage, by far the lowest of any region of the world (Table 5.1). The situation is even worse in rural areas, where only 31% of the population has improved sanitation, compared with 78% coverage in urban areas. Total water coverage in Asia is also the second lowest, after Africa, at 81%. But again, water supply coverage is lower in rural areas (75%) compared with that in urban areas (93%).

Because of the population sizes of China and India, along with other large nations in the region, Asia accounts for the vast majority of people in the world without access to improved services. Eighty percent of the global population without access to improved sanitation, and almost two-thirds without access to improved water supply, live in Asia.

At present, approximately one-third of the Asian population is urban and two-thirds live in rural areas. But this balance is predicted to shift over the coming decades. By the year 2015, the urban population is projected to be 45% of the region's total, and grow to just over one-half of the total Asian population by 2025. This population growth will place enormous strain on already over-burdened services, especially in urban centres. To meet the international development target of halving the proportion of people without access to improved services by 2015, an additional 1.5 billion people in Asia will need access to sanitation facilities, while an additional 980 million will need access to water supply.

7.2 Water supply and sanitation coverage

Table 7.1 provides water supply and sanitation data for 1990 and 2000, by country, area or territory. Composite coverage data are presented in Maps 7.1 and 7.2, and in Figures 7.1 and 7.2.

TABLE 7.1 ASIA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000

	Year	Total population[1] (thousands)	Urban population (thousands)	Rural population (thousands)	% urban water supply coverage	% rural water supply coverage	% total water supply coverage	% urban sanitation coverage	% rural sanitation coverage	% total sanitation coverage
Afghanistan	1990	14 755	2 692	12 063						
	2000	22 720	4 971	17 749	19	11	13	25	8	12
Armenia	1990	3 544	2 391	1 153						
	2000	3 519	2 462	1 057						
Azerbaijan	1990	7 159	3 897	3 262						
	2000	7 734	4 429	3 305						
Bahrain	1990	490	429	61						
	2000	617	569	48						
Bangladesh	1990	109 466	21 090	88 376	98	89	91	78	27	37
	2000	129 155	31 665	97 490	99	97	97	82	44	53
Bhutan	1990	1 696	87	1 609						
	2000	2 124	152	1 972	86	60	62	65	70	69
Brunei Darussalam	1990	257	169	88						
	2000	328	237	91						
Cambodia	1990	8 652	1 090	7 562						
	2000	11 168	1 778	9 390	53	25	30	58	10	18
China	1990	1 155 306	316 563	838 743	99	60	71	57	18	29
	2000	1 277 558	409 965	867 593	94	66	75	68	24	38
China, Hong Kong SAR	1990	5 704	5 701	3						
	2000	6 927	6 927	0						
China, Macao SAR	1990	372	367	5						
	2000	473	468	5						
Cyprus	1990	681	350	331	100	100	100	100	100	100
	2000	786	446	340	100	100	100	100	100	100
Democratic People's Republic of Korea	1990	20 461	11 946	8 515						
	2000	24 039	14 481	9 558	100	100	100	99	100	99
East Timor	1990	740	58	682						
	2000	884	66	818						
Gaza Strip	1990	643	601	42						
	2000	1 121	1 060	61						
Georgia	1990	5 460	3 060	2 400						
	2000	4 967	3 015	1 952						

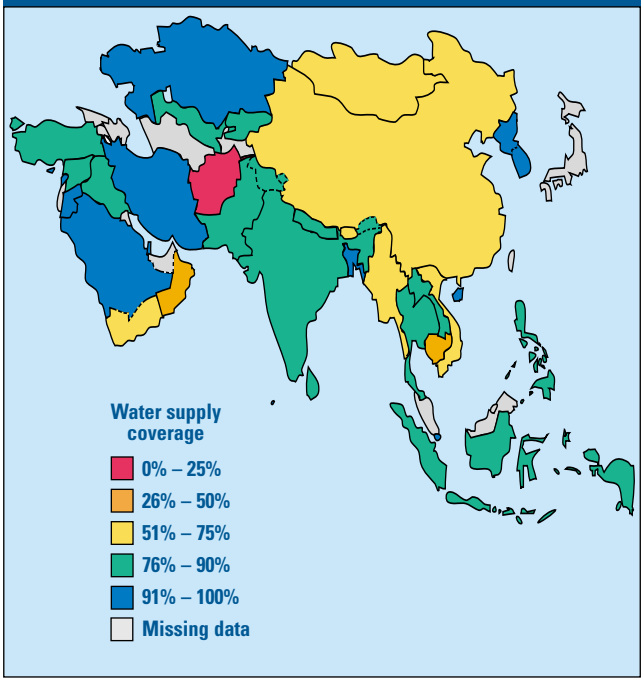
TABLE 7.1 ASIA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000 (CONT.)

India	1990	850 785	217 254	633 531	92	73	78	58	8	21
	2000	1 013 662	288 283	725 379	92	86	88	73	14	31
Indonesia	1990	182 812	55 923	126 889	90	60	69	76	44	54
	2000	212 108	86 833	125 275	91	65	76	87	52	66
Iran (Islamic Republic of)	1990	56 309	31 720	24 589	95	75	86	86	74	81
	2000	67 702	41 709	25 993	99	89	95	86	74	81
Iraq	1990	18 078	12 987	5 091						
	2000	23 115	17 756	5 359	96	48	85	93	31	79
Israel	1990	4 660	4 206	454						
	2000	6 217	5 668	549						
Japan	1990	123 537	95 575	27 962						
	2000	126 714	99 788	26 926						
Jordan	1990	4 619	3 140	1 479	99	92	97	100	95	98
	2000	6 669	4 948	1 721	100	84	96	100	98	99
Kazakhstan	1990	16 742	9 546	7 196						
	2000	16 223	9 157	7 066	98	82	91	100	98	99
Kuwait	1990	2 143	2 054	89						
	2000	1 971	1 924	47						
Kyrgyzstan	1990	4 395	1 645	2 750						
	2000	4 699	1 563	3 136	98	66	77	100	100	100
Lao People's	1990	4 152	750	3 402						
Democratic Republic	2000	5 433	1 275	4 158	59	100	90	84	34	46
Lebanon	1990	2 555	2 151	404						
	2000	3 282	2 945	337	100	100	100	100	87	99
Malaysia	1990	17 845	8 891	8 954						
	2000	22 244	12 772	9 472		94			98	
Maldives	1990	216	56	160						
	2000	286	75	211	100	100	100	100	41	56
Mongolia	1990	2 217	1 285	932						
	2000	2 663	1 691	972	77	30	60	46	2	30
Myanmar	1990	40 520	9 984	30 536	88	56	64	65	38	45
	2000	45 611	12 628	32 983	88	60	68	65	39	46
Nepal	1990	18 772	1 680	17 092	96	63	66	68	16	21
	2000	23 931	2 844	21 087	85	80	81	75	20	27
Oman	1990	1 785	1 109	676	41	30	37	98	61	84
	2000	2 542	2 135	407	41	30	39	98	61	92
Pakistan	1990	119 155	37 987	81 168	96	79	84	78	13	34
	2000	156 483	57 968	98 515	96	84	88	94	42	61
Philippines	1990	60 687	29 612	31 075	94	81	87	85	64	74
	2000	75 967	44 530	31 437	92	80	87	92	71	83
Qatar	1990	485	436	49						
	2000	599	554	45						
Republic of Korea	1990	42 870	31 658	11 212						
	2000	46 844	38 354	8 490	97	71	92	76	4	63
Saudi Arabia	1990	16 045	12 600	3 445						
	2000	21 607	18 526	3 081	100	64	95	100	100	100
Singapore	1990	3 016	3 016	0	100		100	100		100
	2000	3 567	3 567	0	100		100	100		100
Sri Lanka	1990	17 046	3 625	13 421	90	59	66	93	79	82
	2000	18 827	4 435	14 392	91	80	83	91	80	83
Syrian Arab Republic	1990	12 386	6 218	6 168						
	2000	16 125	8 783	7 342	94	64	80	98	81	90
Tajikistan	1990	5 303	1 679	3 624						
	2000	6 188	1 704	4 484						
Thailand	1990	55 595	10 410	45 185	83	68	71	97	83	86
	2000	61 399	13 252	48 147	89	77	80	97	96	96
Turkey	1990	56 098	34 324	21 774	82	76	80	98	70	87
	2000	66 591	50 164	16 427	82	84	83	98	70	91
Turkmenistan	1990	3 668	1 652	2 016						
	2000	4 459	1 997	2 462						
United Arab Emirates	1990	1 921	1 554	367						
	2000	2 441	2 097	344						
Uzbekistan	1990	20 515	8 230	12 285						
	2000	24 318	8 968	15 350	96	78	85	100	100	100
Viet Nam	1990	66 689	13 157	53 532	81	40	48	86	70	73
	2000	79 832	15 749	64 083	81	50	56	86	70	73
Yemen	1990	11 590	2 648	8 942	85	60	66	80	27	39
	2000	18 112	4 476	13 636	85	64	69	87	31	45

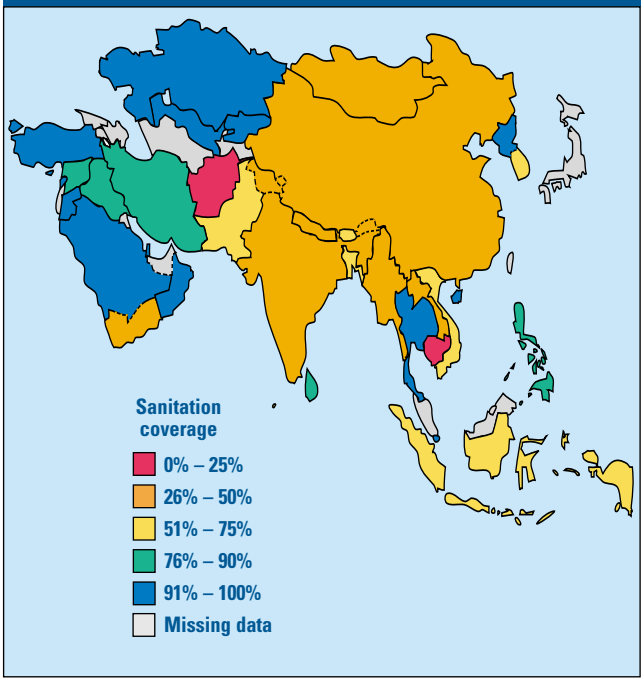
[1]Source: *(10)*

Maps 7.1 and 7.2, which are based on the data in Table 7.1, show that in nearly every country, area or territory, water supply coverage is higher than sanitation coverage in 2000. Kazakhstan, Kyrgyzstan, Oman, the Syrian Arab Republic, Thailand, Turkey and Uzbekistan appear to be exceptions. In general, the countries of western Asia have higher coverage levels than those to the east and south of the region. The Islamic Republic of Iran, Jordan, Lebanon and Saudi Arabia are among the countries with the highest service coverage levels. The Assessment 2000 also found relatively high levels of service coverage in the central Asian countries of Kazakhstan, Kyrgyzstan and Uzbekistan. These countries are, however, in a process of transition and their experience of water supply and sanitation services may be more changeable than that of many other countries in the region. The coverage estimates for these three countries are based on data for the years 1995–1997 and it may be that they are not representative of the present status of services. The example of Tajikistan may be interesting in this context (see Box 7.1).

MAP 7.1 ASIA: WATER SUPPLY COVERAGE, 2000



MAP 7.2 ASIA: SANITATION COVERAGE, 2000



BOX 7.1 TAJIKISTAN: DECREASING WATER SUPPLY

Historically, the communities of Khatlon province in southern Tajikistan used the waters of the Vakhsh and Pyandj rivers originating in the Pamir glaciers, and most permanent settlements were located along these rivers. In Soviet times, arid terraces in the river valleys were irrigated to allow for agriculture. Towns and villages relied on a centralized piped supply of drinking-water from groundwater sources. Despite significant wastage of water, most of the population had access to safe water as defined by international standards.

By the mid-1980s, growing demand had outstripped groundwater capacity and it was discovered that the source had been contaminated by the Vakhsh chemical plant. Work started on a new water pipeline, but was left unfinished because of economic and political disruption.

In 1995, it was estimated that less than 10% of the rural population of Khalton province had access to safe drinking- water and less than 5% to sewerage systems. For example, in Gozimalik district, just 5% of the population had access to safe water and only 2% to safe sanitation. In Jillikul district the situation was even worse, with 4% of the population having access to safe water and no one with access to safe sanitation.

The absence of clean water has had a devastating impact on hygiene, especially in rural schools and hospitals. Health education, although obligatory under the Soviet regime, has increasingly been neglected. The results are evident in deteriorating child health. The infant mortality rate, which increased in 1993–1994, remains one of the highest among former Soviet countries.

Source: *(29)*

Some of the countries with the largest populations in the region also have the lowest coverage levels, especially for sanitation; China and India are the principal examples. Afghanistan, Cambodia, Mongolia, Myanmar, Nepal and Yemen also have extremely low levels of sanitation coverage. There is evidently a need to accord priority to improving sanitation coverage. Box 7.2 gives an indication of the obstacles to be overcome in the case of Nepal, while Box 7.3 describes an example of social mobilization to construct latrines in Myanmar.

BOX 7.2 NEPAL: THE NEED TO PRIORITIZE SANITATION

The lack of access to sanitation in Nepal is striking. A total of 73% of the population is without access to sanitation, one of the highest proportions in Asia. By comparison, the average proportion of the population without access for all Asian countries is 52%. In Nepal, the economic loss associated with inadequate sanitation was estimated to be US$ 153 million in 1996, equivalent to 4.1% of the GDP.

The reasons for the low priority accorded to sanitation by politicians and the general public may be related to perceptions and beliefs. A survey carried out in 1997 indicated that 67% of the people surveyed had not felt a need for sanitation. Another recent survey showed that 54% of the general public, and only 11% of local leaders, thought that the local development budget should be used to implement water and sanitation programmes.

A successful sanitation project in Kerabari, in the Morang district of Nepal, underlines the importance of involving the community and local politicians in planning and implementation. This can be done through appropriate sanitation campaigns, orientation, training, transfer of technology and the establishment of a revolving fund. The marketing of sanitation should draw on commercial techniques, based on product, price, place and promotion. Sanitation should be treated as a priority in its own right, and not simply as an add-on to more attractive water supply programmes.

Source: *(30)*

In only three Asian countries, Afghanistan, Cambodia and Oman, is the water supply coverage less than 50%. In contrast, the sanitation coverage is less than 50% in approximately one-third of Asian countries, and in Afghanistan and Cambodia both water supply and sanitation coverage is less than 50%.

BOX 7.3 MYANMAR: SOCIAL MOBILIZATION TO INCREASE LATRINE CONSTRUCTION

The goal of Myanmar's National Sanitation Week in 1995 was to motivate one million families (12% of households throughout the country) to construct their own sanitary latrines. This meant motivating about 15 families in each of Myanmar's 66 000 villages and wards – a manageable task. National television broadcast educational and advocacy messages, and newspapers printed articles promoting the National Sanitation Week.

When township authorities and health staff were committed to achieving the national goal, the National Sanitation Week was successful. Social mobilization, with the active participation of health workers, nongovernmental organizations, teachers and household heads, created a sense of community ownership of the strategy. To reduce costs so as to bring sanitary latrines within the reach of all families, some village leaders organized the bulk purchase of bamboo. Many families contributed labour and locally available materials were widely used. Nearly 800 000 new sanitary latrines were constructed, representing additional sanitary facilities for almost 10% of the population.

The strategy was more successful than an earlier effort to promote community participation by providing families with free latrines pans, which proved too costly and had to be phased out. In 1999, National Sanitation Week for the second time promoted the goal of another one million latrines.

Source: *(28)*

7.3 Changes during the 1990s

During the 1990s coverage with both water supply and sanitation increased in Asia (Figures 7.1 and 7.2). It should be remembered that the figures for China and India strongly influence the total figures for Asia, and apart from urban water supply, each of the services has increased in these two countries. However, excluding India and China from the regional figures does not greatly change the picture: the increases in both rural and total water supply and sanitation coverage between 1990 and 2000 look very similar. The main difference when the data for China and India are excluded is that sanitation coverage for the remainder of the region becomes higher, higher in fact than that of Africa.

Figure 7.1 Asia: water supply coverage, 1990 and 2000

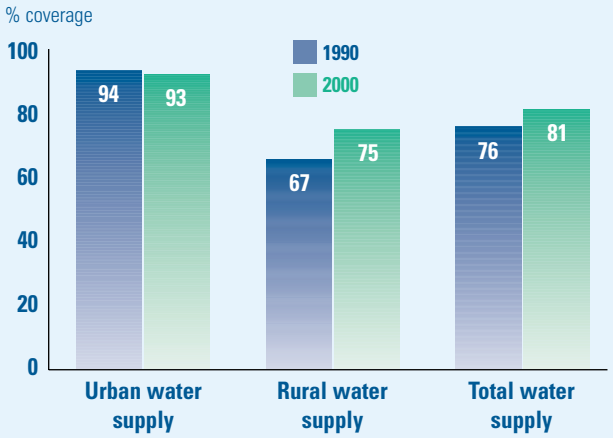
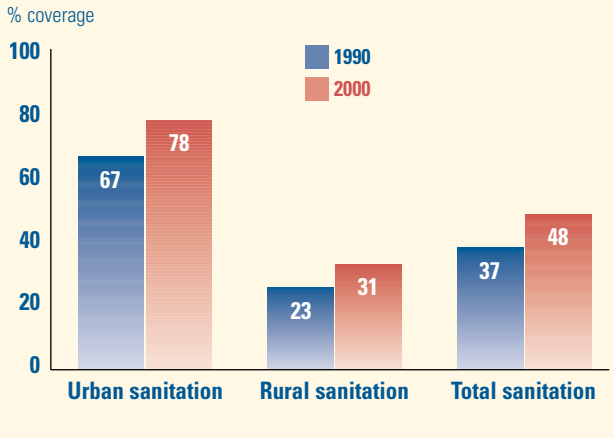


Figure 7.2 Asia: sanitation coverage, 1990 and 2000



7.4 Trends and future needs

Figures 7.3–7.8 show the numbers of people with and without water supply and sanitation coverage in Asia, for 1990 and 2000. The projected population growth and target coverage for 2015 and 2025 are also shown. Over the 1990s, an enormous number of people in the region gained access to services (Figures 7.3 and 7.6). For example, although percentage coverage has actually dropped slightly for urban water supply, an additional 282 million people gained access (Figure 7.4). At the same time, 303 million people gained access to water supply in rural areas (Figure 7.5). The numbers of additional people who gained access to sanitation are almost as high: the Assessment 2000 findings suggest that 365 million urban dwellers and 216 million rural dwellers gained access to sanitation facilities over the same period (Figures 7.7 and 7.8).

It is predicted that population growth in the region will continue to increase. To achieve the target of halving the proportion of people without access to improved services by the year 2015, enormous effort will be required. For urban water supply, an additional 619 million people will need to gain access to services over the next 15 years (Figure 7.4). For rural water supply, the figure is 361 million people (Figure 7.5). Therefore, to meet the target for water supply, almost one billion additional people will require access in Asia alone. As an example of activities already under way, Box 7.4 describes an attempt to increase access to water supply in Viet Nam.

BOX 7.4 VIET NAM: INCREASING ACCESS TO WATER SUPPLY

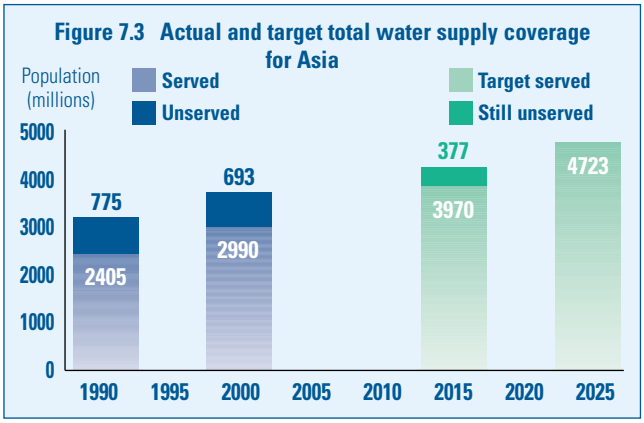
Saltwater intrusion and increased agricultural activity have polluted surface water throughout the Mekong Delta. To find fresh water, more than 43 000 tubewells up to 400 metres deep were drilled to tap into fresh-water aquifers. Furthermore, surveys carried out in 1996 and 1997 indicated that thousands of wells in the area were only being used at about 5% of their capacity. The challenge was to find ways of increasing access to clean water by more effectively exploiting existing wells, rather than drilling new wells.

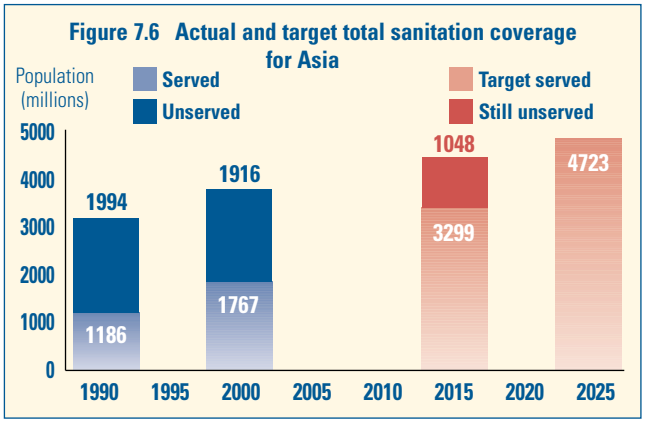
A project began in the commune of Luong Hoa. Extensive discussions with community members led to an agreement to construct and maintain a piping system to bring water directly to their homes. Virtually every household agreed to contribute financial support. The funds collected for each cubic metre of water are enough to cover electricity and operational costs, as well as to maintain a contingency fund for the future repair or expansion of the system.

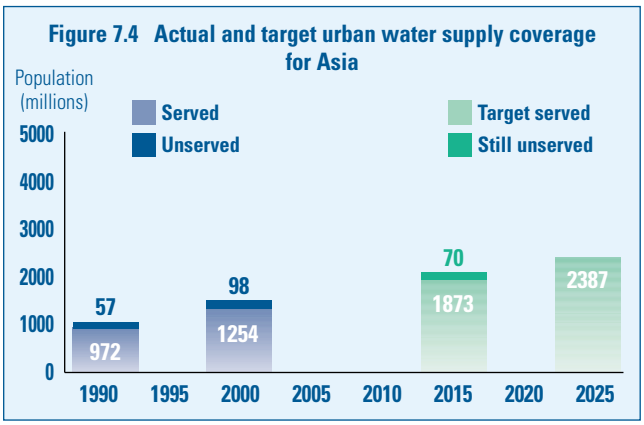
The project has expanded to cover new piping systems in 49 communes in the provinces of Vinh Long and Tien Giang, benefiting an estimated 22 000 people. The experience shows that relatively small amounts of capital can act as a catalyst in helping people to help themselves. Community support for small piping systems can be a low-cost method of increasing rural water supplies.

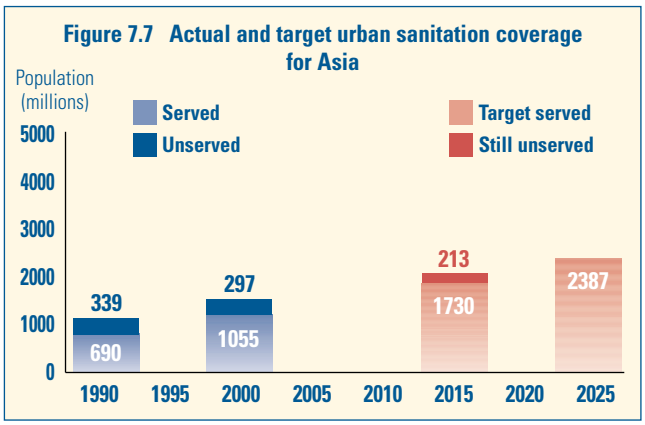
Source: *(28)*

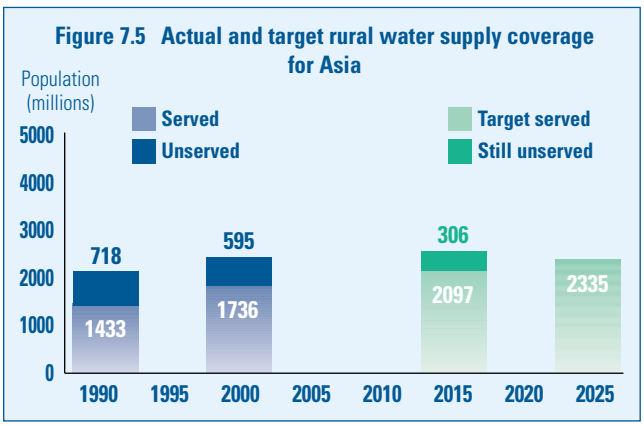
To meet the 2015 target for sanitation, an additional 675 million people in urban areas and 857 million people in rural areas will need to gain access to facilities (Figures 7.7 and 7.8). In total, around 1.5 billion people in Asia will need to gain access to improved services. The incredibly large number of people requiring access to rural sanitation in the region is a reflection of both the size of the rural population and the very low current level of coverage. Halving the population without service means meeting the needs of a huge number of people.

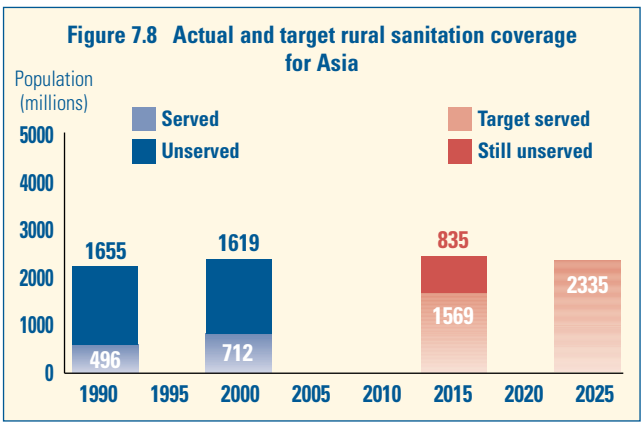












8. Latin America and the Caribbean

This chapter presents data for Latin America and the Caribbean. Urban and rural water supply and sanitation coverage figures are shown by country, area or territory for both 1990 and 2000. Maps of current coverage are also presented. Graphs illustrate regional changes in coverage over time, as well as coverage targets associated with projected changes in population.

8.1 Overview

Coverage estimates based on data for 99% of the region's population, collected as part of the Assessment 2000, suggest that the region has relatively high service levels. For example, total coverage with water supply is approximately 85% of the population (Figure 8.1), while total sanitation coverage is slightly lower at 78% (Figure 8.2). Large disparities are apparent between urban and rural areas, with an estimated 87% of the urban population having sanitation coverage, but only 49% of the rural population having coverage. For water supply, 93% of the urban population enjoys coverage, while only 62% of the rural population is covered. Part of these discrepancies may be due to local definitions of "safe" or "improved" service. For example, some countries in the region, for which household surveys were not conducted, may have used higher standards when defining services. In these cases, the coverage figures may be underestimated.

A total of 78 million people are without access to improved water supply in the region. In comparison, 117 million people are reported to be without access to improved sanitation services. The vast majority of these people live in South America.

8.2 Water supply and sanitation coverage

Table 8.1 provides data for 1990 and 2000 by country, area or territory. Composite coverage data are presented in Maps 8.1 and 8.2, and in Figures 8.1 and 8.2.

TABLE 8.1 LATIN AMERICA AND THE CARIBBEAN: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000

	Year	Total population[1] (thousands)	Urban population (thousands)	Rural population (thousands)	% urban water supply coverage	% rural water supply coverage	% total water supply coverage	% urban sanitation coverage	% rural sanitation coverage	% total sanitation coverage
Anguilla	1990	8	1	7						
	2000	8	1	7	60	60	60	99	99	99
Antigua and Barbuda	1990	64	23	41						
	2000	68	25	43	95	88	91	98	94	96
Argentina	1990	32 527	28 141	4 386						
	2000	37 032	33 299	3 733	85	30	79	89	48	85
Aruba	1990	-	-	-						
	2000	-	-	-			100			
Bahamas	1990	255	213	42						
	2000	306	271	35	98	86	96	93	94	93
Barbados	1990	257	115	142	100	100	100	100	100	100
	2000	270	135	135	100	100	100	100	100	100
Belize	1990	187	89	98						
	2000	241	131	110	83	69	76	59	21	42
Bolivia	1990	6 573	3 653	2 920	92	52	74	77	28	55
	2000	8 329	5 203	3 126	93	55	79	82	38	66
Brazil	1990	147 940	110 524	37 416	93	50	82	84	37	72
	2000	170 115	138 269	31 846	95	54	87	85	40	77
British Virgin Islands	1990	16	8	8						
	2000	21	13	8	98	98	98	100	100	100
Cayman Islands	1990	26	26	0						
	2000	38	38	0						
Chile	1990	13 099	10 908	2 191	98	48	90	98	93	97
	2000	15 212	13 031	2 181	99	66	94	98	93	97
Colombia	1990	34 970	24 291	10 679	95	68	87	95	53	82
	2000	42 322	31 274	11 048	98	73	91	97	51	85
Costa Rica	1990	3 049	1 395	1 654						
	2000	4 024	1 925	2 099	98	98	98	98	95	96
Cuba	1990	10 627	7 827	2 800						
	2000	11 201	8 436	2 765	99	82	95	96	91	95
Dominica	1990	71	48	23						
	2000	70	50	20	100	90	97			
Dominican Republic	1990	7 110	4 142	2 968	83	70	78	66	52	60
	2000	8 495	5 526	2 969	83	70	79	75	64	71

TABLE 8.1 LATIN AMERICA AND THE CARIBBEAN: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000 (CONT.)

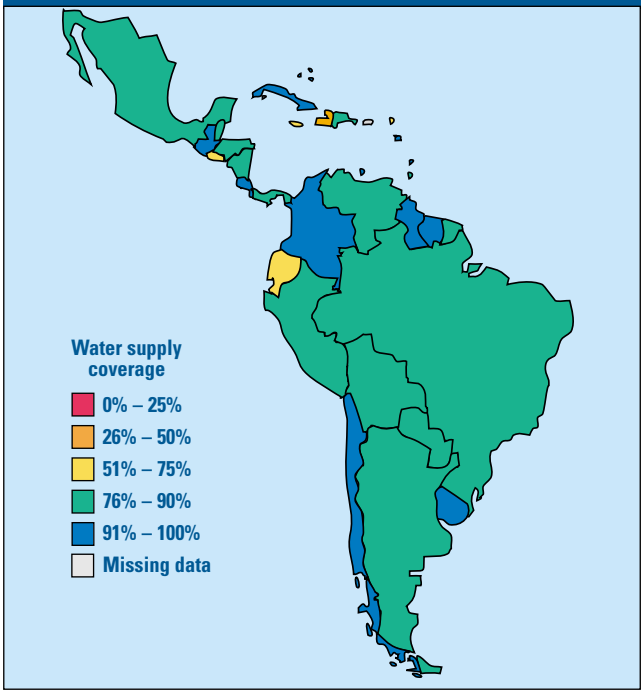
Ecuador	1990	10 264	5 655	4 609						
	2000	12 646	8 262	4 384	81	51	71	70	37	59
El Salvador	1990	5 110	2 242	2 868		47				
	2000	6 276	2 927	3 349	88	61	74	88	78	83
Falkland Islands/	1990	3	2	1						
Islas Malvinas	2000	2	2	0						
French Guiana	1990	117	87	30						
	2000	182	142	40	88	71	84	85	57	79
Grenada	1990	91	31	60						
	2000	94	36	58	97	93	94	96	97	97
Guadeloupe	1990	391	385	6						
	2000	455	454	1	94	94	94	61	61	61
Guatemala	1990	8 749	3 333	5 416	88	72	78	94	66	77
	2000	11 385	4 515	6 870	97	88	92	98	76	85
Guyana	1990	795	264	531						
	2000	861	329	532	98	91	94	97	81	87
Haiti	1990	6 916	2 038	4 878	55	42	46	48	15	25
	2000	8 222	2 935	5 287	49	45	46	50	16	28
Honduras	1990	4 879	2 040	2 839	90	79	84	85		
	2000	6 485	3 420	3 065	97	82	90	94	57	77
Jamaica	1990	2 369	1 219	1 150						
	2000	2 583	1 449	1 134	81	59	71	98	66	84
Martinique	1990	360	326	34						
	2000	395	375	20						
Mexico	1990	83 226	60 305	22 921	92	61	83	85	28	69
	2000	98 881	73 553	25 328	94	63	86	87	32	73
Montserrat	1990	11	2	9	100	100	100	100	100	100
	2000	11	2	9	100	100	100	100	100	100
Netherlands Antilles	1990	187	128	59						
	2000	217	153	64						
Nicaragua	1990	3 827	2 031	1 796	93	44	70	97	53	76
	2000	5 074	2 848	2 226	95	59	79	96	68	84
Panama	1990	2 397	1 288	1 109						
	2000	2 855	1 606	1 249	88	86	87	99	87	94
Paraguay	1990	4 218	2 054	2 164	80	47	63	92	87	89
	2000	5 497	3 077	2 420	95	58	79	95	95	95
Peru	1990	21 570	14 862	6 708	84	47	72	81	26	64
	2000	25 662	18 674	6 988	87	51	77	90	40	76
Puerto Rico	1990	3 528	2 516	1 012						
	2000	3 869	2 910	959						
Saint Kitts and Nevis	1990	41	14	27						
	2000	38	13	25			98			96
Saint Lucia	1990	134	50	84						
	2000	154	58	96			98			
Saint Vincent and	1990	106	43	63						
the Grenadines	2000	114	62	52			93			96
Suriname	1990	402	263	139						
	2000	418	310	108	94	96	95	100	34	83
Trinidad and Tobago	1990	1 216	840	376						
	2000	1 295	959	336			86			88
Turks and Caicos Islands	1990	12	5	7						
	2000	17	8	9	100	100	100	98	94	96
United States	1990	102	45	57						
Virgin Islands	2000	93	43	50						
Uruguay	1990	3 106	2 755	351						
	2000	3 337	3 045	292	98	93	98	96	89	95
Venezuela	1990	19 502	16 378	3 124						
	2000	24 170	21 010	3 160	88	58	84	75	69	74

[1]Source: *(10)*

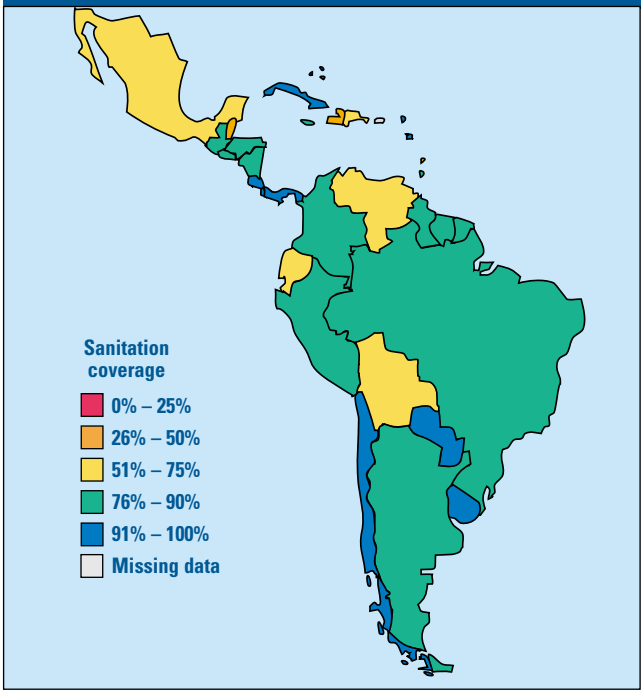
The water supply and sanitation coverage data for the year 2000 are presented in Maps 8.1 and 8.2, and are based on the data in Table 8.1. The maps show that in the vast majority of countries in the region more than 75% of the people have both water supply and sanitation coverage. The countries of the Caribbean tend to have the highest reported coverage levels in the region, although the maps do not show this clearly.

In only one country of the region, Haiti, is less than 50% of the population without improved water supply. Similarly, there are only two countries with less than 50% sanitation coverage, Belize and Haiti.

MAP 8.1 LATIN AMERICA AND THE CARIBBEAN: WATER SUPPLY COVERAGE, 2000



MAP 8.2 LATIN AMERICA AND THE CARIBBEAN: SANITATION COVERAGE, 2000



8.3 Changes during the 1990s

The findings of the Assessment 2000 suggest that percentage rural service coverage has increased for both water supply and sanitation. Urban services appear to have changed less, and urban water supply coverage in the region even declined slightly between 1990 and 2000. These population-based regional figures are strongly affected by the coverage figures for Brazil, whose current population (>170 million) represents one-third of the regional total. Natural disasters also affect coverage (Box 8.1).

BOX 8.1 HONDURAS: THE IMPACT OF NATURAL DISASTERS ON WATER SUPPLY

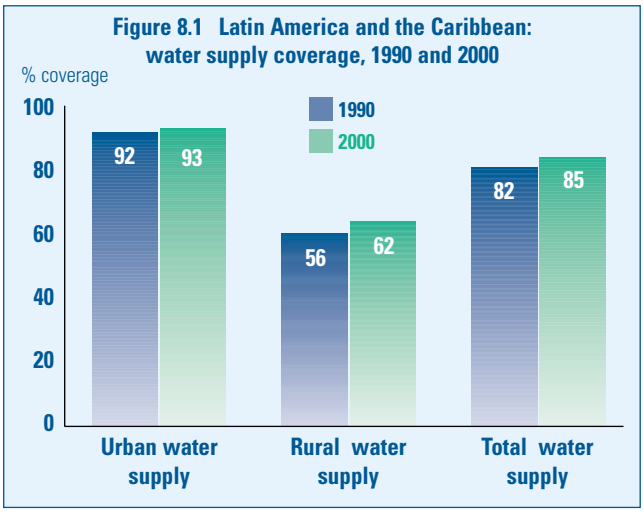
Natural disasters may threaten advances made in the coverage and quality of water supply and sanitation services. Indeed, it has become evident that the services most severely affected by natural phenomena are water supply, drainage and sewerage systems. Despite progress in natural disaster prevention, mitigation and response, there is still a long way to go.

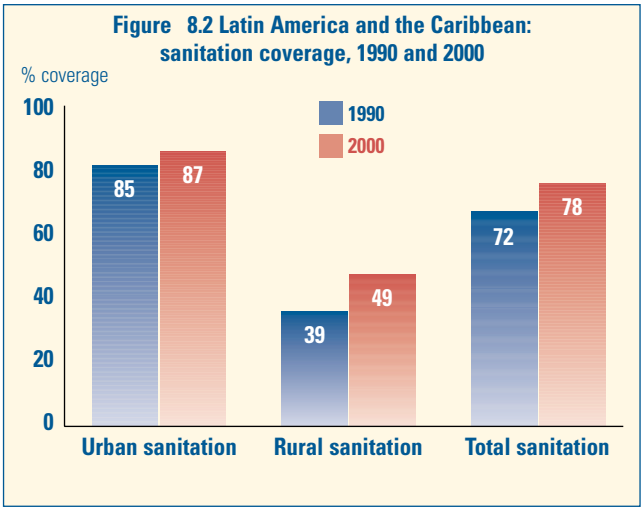
In 1998, Hurricane Mitch caused US$ 58 million of damage in Honduras alone. The devastation included the destruction of 85 000 latrines and 1683 rural water mains. This meant that 75% of the population – approximately 4.5 million people – lost access to drinking-water. Devastation such as that caused by Hurricane Mitch may last for months or even years.

There is clearly a need for a major effort to reduce vulnerability, with the involvement of all those who invest in the sector. The task is to ensure the sustainability of water supply and sanitation systems in the face of natural phenomena.

Technical guidance is available on how to deal with the different types of natural threat, based on practical experience in the Americas.
This guidance is available at:
http://www.paho.org/english/ped/pedsnew.htm
(in English) and
http://www.paho.org/spanish/ped/pedsres.htm
(in Spanish).

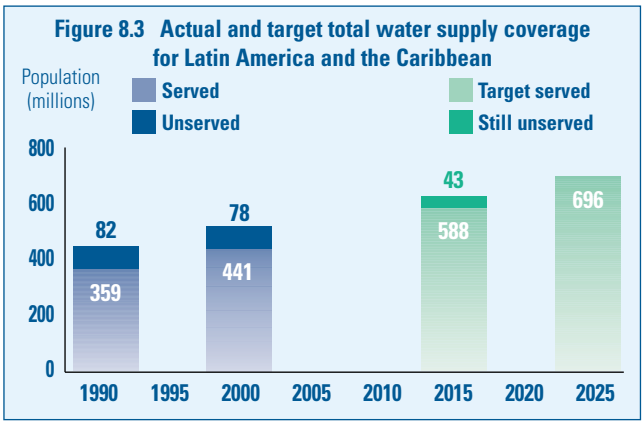
Sources: *(31)*

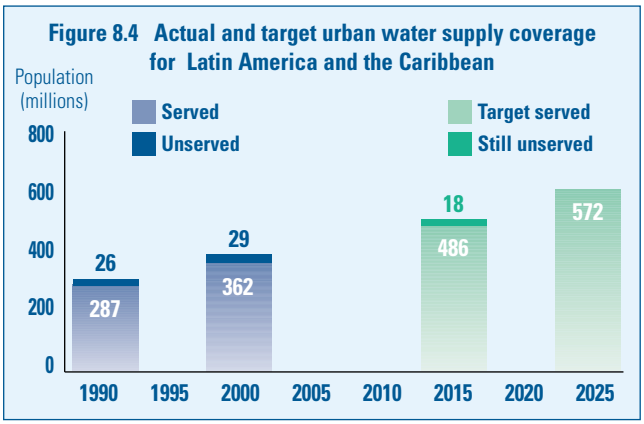


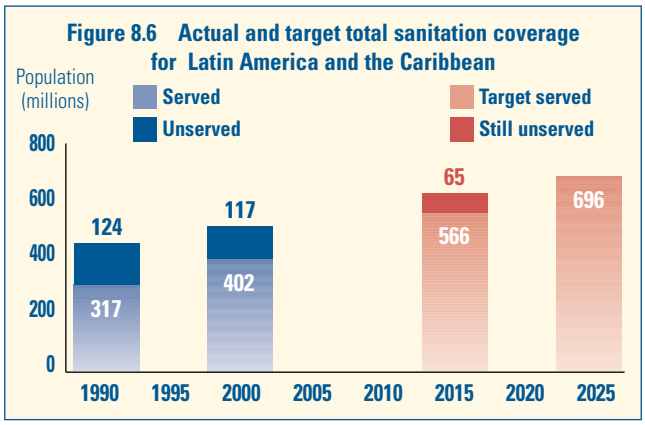


8.4 Trends and future needs

Figures 8.3–8.8 show the numbers of people with and without improved water and sanitation services in Latin America and the Caribbean in 1990 and 2000, as well as the international development targets for the sector. The development targets correspond to the population projections for the region. It is predicted that the population of the region will continue to increase over the coming decades. To meet the target of halving the proportion of people without access to improved water supply and sanitation by 2015, approximately 123 million additional people in urban areas and 23 million additional people in rural areas will require access water supply. For sanitation, 131 million additional urban dwellers and 32 million additional rural dwellers will need access to services.







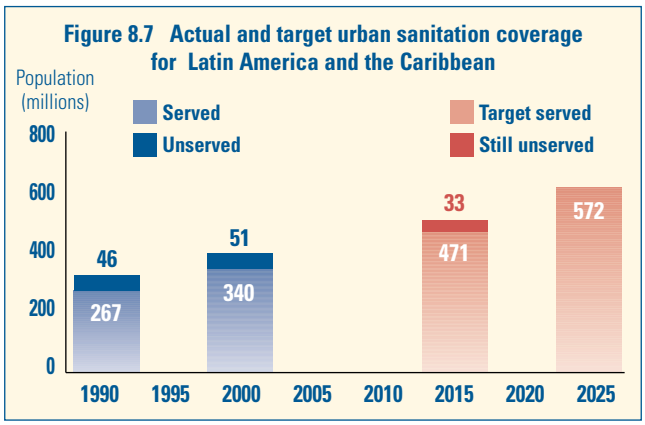


Figure 8.5 Actual and target rural water supply coverage for Latin America and the Caribbean

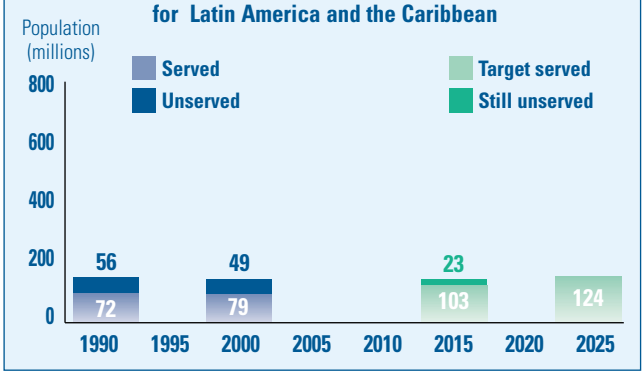
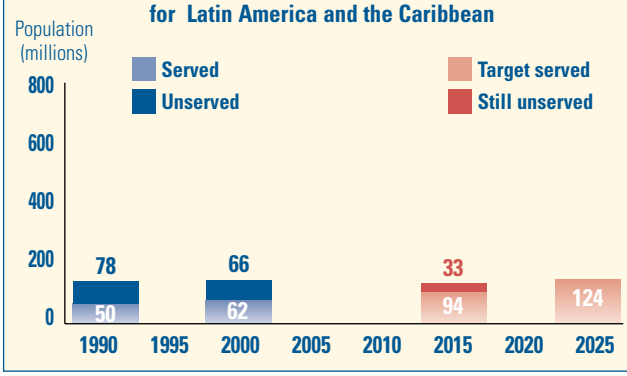


Figure 8.8 Actual and target rural sanitation coverage for Latin America and the Caribbean



9. Oceania

This chapter presents data for Oceania. Urban and rural water supply and sanitation coverage figures are shown by country, area or territory for both 1990 and 2000. Maps of current coverage are also presented. Graphs illustrate regional changes in coverage over time, as well as coverage targets associated with projected changes in population.

9.1 Overview

Oceania is the least populated of the six regions described in this report. The current status of its sanitation coverage appears to be relatively good, with 93% of the population having access to improved sanitation; and 88% of the population has access to improved water supply. These figures are strongly biased by the large and well-served population of Australia. When the figures for Australia are excluded, coverage levels are much lower. Patterns of urban and rural coverage are difficult to distinguish, as some of the small islands in this region define themselves as either entirely urban or entirely rural.

Population growth in Oceania is expected to continue over the coming decades. To meet the 2015 international development targets, this means that an additional 7.3 million people will need access to improved water supply services, and an additional 6.5 million will need access to sanitation. The specific characteristics of the islands need to be taken into account in efforts to increase water supply and sanitation coverage. In Box 9.1 some of these aspects are discussed.

BOX 9.1 PACIFIC ISLANDS: CHALLENGES FOR SANITATION PROMOTION – CULTURE AND TRADITION

Providing water supply and sanitation services is only half of the problem. The other half is making sure that people use them.

The national policy in Papua New Guinea requires water supply and sanitation to be implemented as a combined programme. Theoretically, no partner agency may support a water supply project without also providing support for sanitation, and vice versa. In the Solomon Islands, a rural water supply and sanitation project has increased the coverage of safe drinking water to about 70% of the population. The project operates on a cost-sharing basis: most of the materials are supplied at a subsidized rate by the project, while all the labour costs are met by the village community. The level of sanitation coverage is, however, low.

Cultural traditions and beliefs may constitute constraints to sanitation. For example, in Papua New Guinea, the ventilated improved pit (VIP) latrine is the sanitation technology of choice. In the Solomon Islands, however, people will only accept flush latrines, even though VIP latrines are less costly and do not require a copious water supply. In many of the Pacific island countries, local people do not allow female children to use the same latrine as male children, although female children may use the latrine that is used by their parents. As a result, families are faced with the extra cost of having at least two latrines. Where this is too expensive, male children have to use the bushes.

Source: *(32)*

9.2 Water supply and sanitation coverage

Table 9.1 provides water supply and sanitation coverage data for 1990 and 2000, by country, area or territory. Composite coverage data are presented in Figures 9.1–9.6.

Two countries in the region, Fiji and Kiribati, report having both water supply and sanitation coverage below 50%. Papua New Guinea also has less than 50% water supply coverage.

TABLE 9.1 OCEANIA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000

	Year	Total population[1] (thousands)	Urban population (thousands)	Rural population (thousands)	% urban water supply coverage	% rural water supply coverage	% total water supply coverage	% urban sanitation coverage	% rural sanitation coverage	% total sanitation coverage
American Samoa	1990	46	22	24	100	100	100			
	2000	68	36	32	100	100	100			
Australia	1990	16 888	14 369	2 519	100	100	100	100	100	100
	2000	18 886	15 994	2 892	100	100	100	100	100	100
Cook Islands	1990	19	11	8	100	100	100	100	100	100
	2000	20	12	8	100	100	100	100	100	100
Fiji	1990	726	302	424						
	2000	817	404	413	43	51	47	75	12	43
French Polynesia	1990	196	110	86				100		
	2000	235	124	111	100	100	100	99	97	98
Guam	1990	134	51	83						
	2000	168	66	102						
Kiribati	1990	72	25	47						
	2000	84	33	51	82	25	47	54	44	48
Marshall Islands	1990	46	30	16						
	2000	64	46	18						
Micronesia, Federated States of	1990	97	71	27						
	2000	119	85	34						
Nauru	1990	10	10	0						
	2000	12	12	0						
New Caledonia	1990	167	103	64						
	2000	214	165	49						
New Zealand	1990	3 361	2 848	513	100					
	2000	3 862	3 314	548	100					
Niue	1990	3	1	2	100	100	100	100	100	100
	2000	2	1	1	100	100	100	100	100	100
Northern Mariana Islands	1990	44	23	21						
	2000	78	41	37					92	
Palau	1990	16	11	5						
	2000	19	14	5	100	20	79	100	100	100
Papua New Guinea	1990	3 839	576	3 263	88	32	42	92	80	82
	2000	4 807	837	3 970	88	32	42	92	80	82
Pitcairn	1990	0	0	0						
	2000	0	0	0						
Samoa	1990	160	34	126						
	2000	180	39	141	95	100	99	95	100	99
Solomon Islands	1990	321	47	274						
	2000	443	87	356	94	65	71	98	18	34
Tokelau	1990	2	0	2						
	2000	2	0	2	97	48	48			
Tonga	1990	96	31	65						
	2000	98	37	61	100	100	100			
Tuvalu	1990	9	4	5						
	2000	12	6	6	100	100	100	100	100	100
Vanuatu	1990	149	27	122						
	2000	190	38	152	63	94	88	100	100	100
Wallis and Futuna Islands	1990	14	0	14						
	2000	15	0	15			100			80

[1] Source: *(10)*

9.3 Trends and future needs

As there are few data for 1990 from the region, analysis of any change over the 1990s should be done cautiously. Figures 9.1–9.6 present projected population change and the international development targets. It is predicted that the total population of the region will increase by 14% over the next 15 years, mainly in the urban areas of Oceania. To achieve the 2015 goal, an additional 4.5 million urban people and 2.8 million rural people will need access to water supply. For sanitation, 4.5 million additional urban people and 2.1 million rural people will require access to facilities. The people requiring service are largely in the small island states of the Federated States of Micronesia, Melanesia and Polynesia.

Figure 9.1 Actual and target total water supply coverage for Oceania

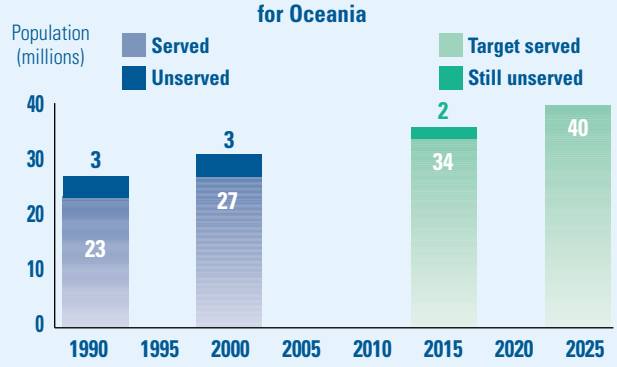


Figure 9.2 Actual and target urban water supply coverage for Oceania

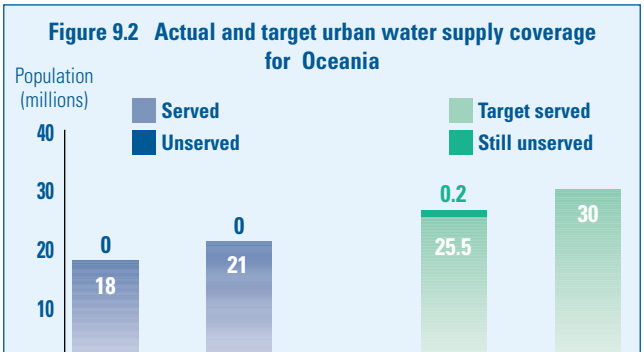


Figure 9.3 Actual and target rural water supply coverage for Oceania

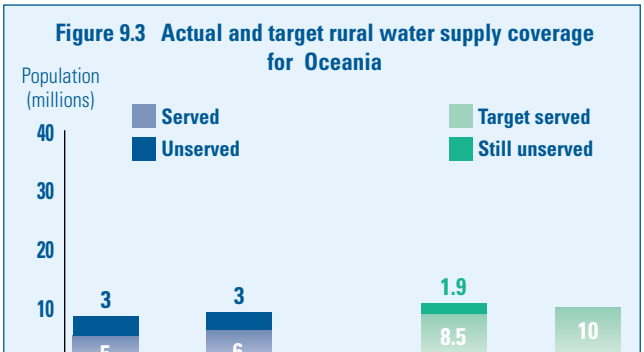


Figure 9.4 Actual and target total sanitation coverage for Oceania

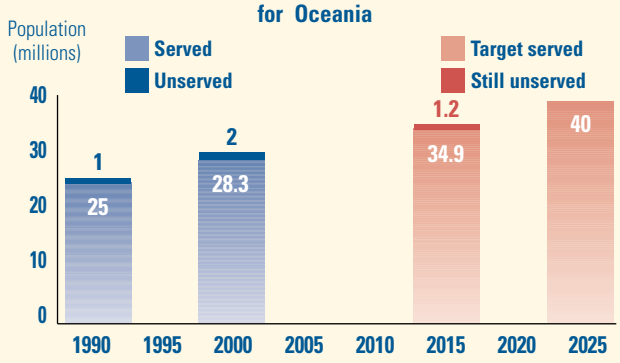


Figure 9.5 Actual and target urban sanitation coverage for Oceania

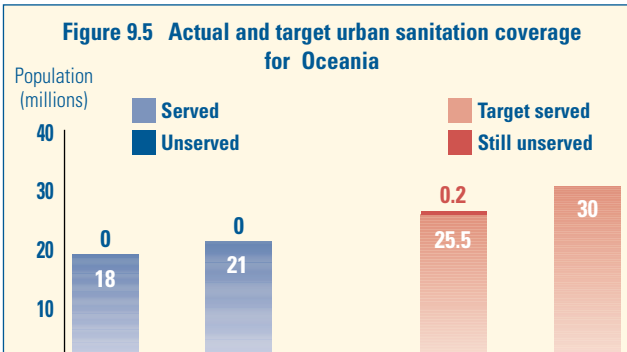
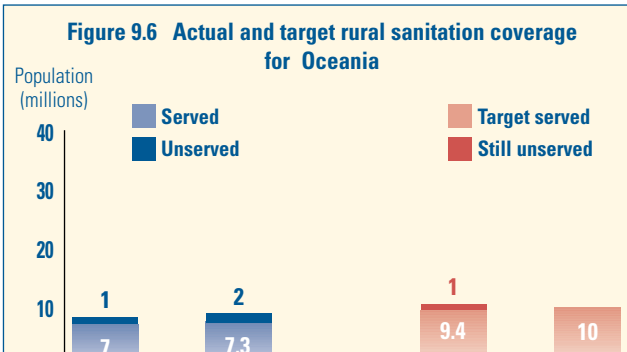


Figure 9.6 Actual and target rural sanitation coverage for Oceania



10. Europe

This chapter presents data for Europe. Urban and rural water supply and sanitation coverage figures are shown by country, area or territory for both 1990 and 2000. Maps of current coverage are also presented. Graphs illustrate regional changes in coverage over time, as well as the coverage targets associated with projected changes in population.

10.1 Overview

The reporting by European countries for the Assessment 2000 was very poor. The coverage data available for 1990 represent a mere 15% of the European region's population, while the data for 2000 represent just 44% of the region's population. This low level of reporting means that the regional figures may not be representative.

The figures suggest that improved water supply coverage in the region is high, with 96% of the population having access. In urban areas, 100% of the population has coverage, while 87% of the rural population has coverage. For sanitation, total coverage is 92% of the population, with 99% of the urban population and 74% of the rural population having access to improved sanitation.

In total, the region contains 728 million people. Those without access to improved water supply represent 2% of the global population, and those without access to improved sanitation represent 1% of the global population.

10.2 Water supply and sanitation coverage

Table 10.1 presents data for 1990 and 2000, by country, area or territory. The 2000 data are presented in Maps 10.1 and 10.2.

TABLE 10.1 EUROPE: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000

	Year	Total population[1] (thousands)	Urban population (thousands)	Rural population (thousands)	% urban water supply coverage	% rural water supply coverage	% total water supply coverage	% urban sanitation coverage	% rural sanitation coverage	% total sanitation coverage
Albania	1990	3 290	1 188	2 102						
	2000	3 114	1 294	1 820						
Andorra	1990	52	49	3						
	2000	78	73	5	100	100	100	100	100	100
Austria	1990	7 706	4 973	2 733	100	100	100	100	100	100
	2000	8 210	5 308	2 902	100	100	100	100	100	100
Belarus	1990	10 259	6 797	3 462						
	2000	10 236	7 283	2 953	100	100	100			
Belgium	1990	9 951	9 606	345						
	2000	10 162	9 892	270						
Bosnia and Herzegovina	1990	4 308	1 691	2 617						
	2000	3 972	1 706	2 266						
Bulgaria	1990	8 718	5 796	2 922						
	2000	8 225	5 722	2 503	100	100	100	100	100	100
Channel Islands	1990	142	42	100						
	2000	153	46	107						
Croatia	1990	4 517	2 441	2 076						
	2000	4 473	2 582	1 891						
Czech Republic	1990	10 306	7 705	2 601						
	2000	10 244	7 653	2 591						
Denmark	1990	5 140	4 357	783						
	2000	5 293	4 516	777	100	100	100			
Estonia	1990	1 572	1 118	454						
	2000	1 396	957	439				93		
Faeroe Islands	1990	47	16	31						
	2000	42	16	26						
Finland	1990	4 986	3 063	1 923	100	100	100	100	100	100
	2000	5 176	3 482	1 694	100	100	100	100	100	100
France	1990	56 718	41 985	14 733						
	2000	59 080	44 644	14 436						
Germany	1990	79 365	67 699	11 666						
	2000	82 221	71 977	10 244						
Gibraltar	1990	27	27	0						
	2000	25	25	0						

TABLE 10.1 EUROPE: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000 (CONT.)

Greece	1990	10 220	6 014	4 206						
	2000	10 645	6 397	4 248						
Holy See	1990	1	1	0						
	2000	1	1	0						
Hungary	1990	10 365	6 426	3 939	100	98	99	100	98	99
	2000	10 036	6 422	3 614	100	98	99	100	98	99
Iceland	1990	255	231	24						
	2000	281	260	21						
Ireland	1990	3 503	1 993	1 510						
	2000	3 730	2 201	1 529						
Isle of Man	1990	69	51	18						
	2000	80	61	19						
Italy	1990	57 024	38 050	18 974						
	2000	57 298	38 387	18 911						
Latvia	1990	2 684	1 888	796						
	2000	2 357	1 626	731						
Liechtenstein	1990	29	6	23						
	2000	32	7	25						
Lithuania	1990	3 738	2 534	1 204						
	2000	3 670	2 511	1 159						
Luxembourg	1990	381	329	52						
	2000	431	394	37						
Malta	1990	354	310	44	100	100	100	100	100	100
	2000	389	352	37	100	100	100	100	100	100
Monaco	1990	30	30	0						
	2000	34	34	0	100	100	100	100	100	100
Netherlands	1990	14 952	13 262	1 690	100	100	100	100	100	100
	2000	15 786	14 108	1 678	100	100	100	100	100	100
Norway	1990	4 241	3 052	1 189	100	100	100	100		
	2000	4 465	3 369	1 096	100	100	100			
Poland	1990	38 119	23 570	145 49						
	2000	38 766	25 415	13 351						
Portugal	1990	9 869	4 605	5 264						
	2000	9 874	6 362	3 512						
Republic of Moldova	1990	4 364	2 047	2 317						
	2000	4 381	2 022	2 359	100	100	100	100		
Romania	1990	23 207	12 442	10 765						
	2000	22 326	12 539	9 787	91	16	58	86	10	53
Russian Federation	1990	148 291	109 733	38 558						
	2000	146 934	114 141	32 793	100	96	99			
San Marino	1990	23	21	2						
	2000	27	24	3						
Slovakia	1990	5 256	2 969	2 287						
	2000	5 388	3 094	2 294	100	100	100	100	100	100
Slovenia	1990	1 918	966	952	100	100	100	100		
	2000	1 986	1 000	986	100	100	100			
Spain	1990	39 304	29 616	9 688						
	2000	39 629	30 761	8 868						
Sweden	1990	8 558	7 112	1 446	100	100	100	100	100	100
	2000	8 910	7 424	1 486	100	100	100	100	100	100
Switzerland	1990	6 834	4 079	2 755	100	100	100	100	100	100
	2000	7 386	5 003	2 383	100	100	100	100	100	100
The Former Yugoslav Republic of Macedonia	1990	1 909	1 103	806						
	2000	2 024	1 255	769						
Ukraine	1990	51 891	34 699	17 192						
	2000	50 456	34 316	16 140						
United Kingdom	1990	57 561	51 273	6 288	100	100	100	100	100	100
	2000	58 830	52 639	6 191	100	100	100	100	100	100

[1]Source: *(10)*

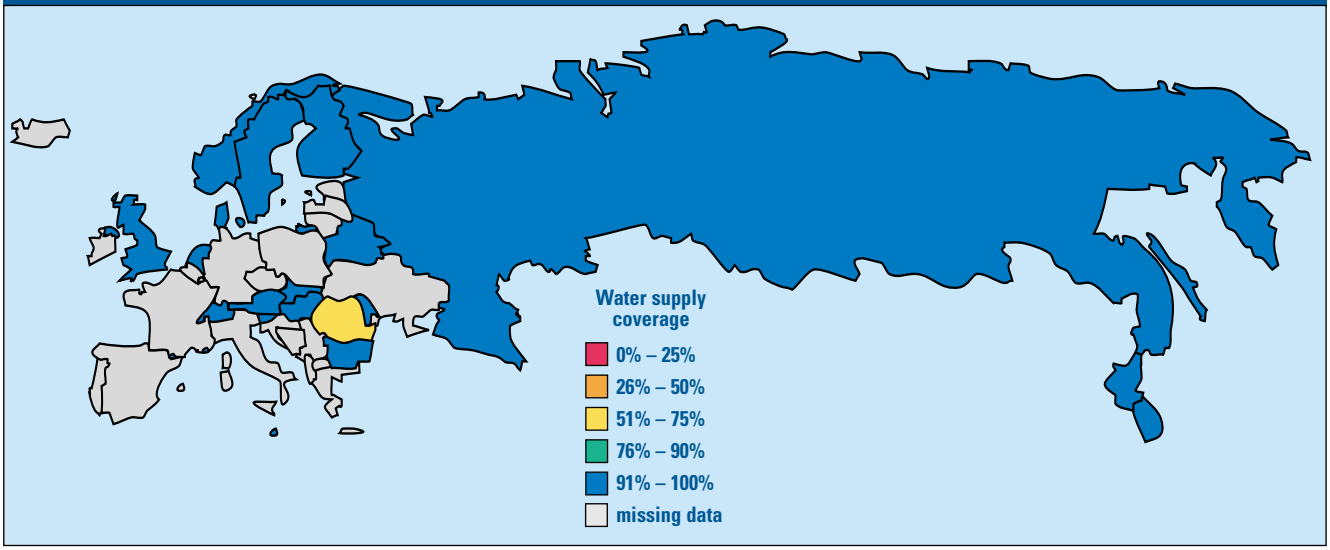
Only four European countries reported not having full water supply and sanitation coverage in 2000 (Table 10.2). All of these countries are in eastern Europe.

Maps 10.1 and 10.2 present the data available for the European region for 2000. The maps show that few countries provided coverage information for the assessment. More countries reported water supply coverage than sanitation coverage.

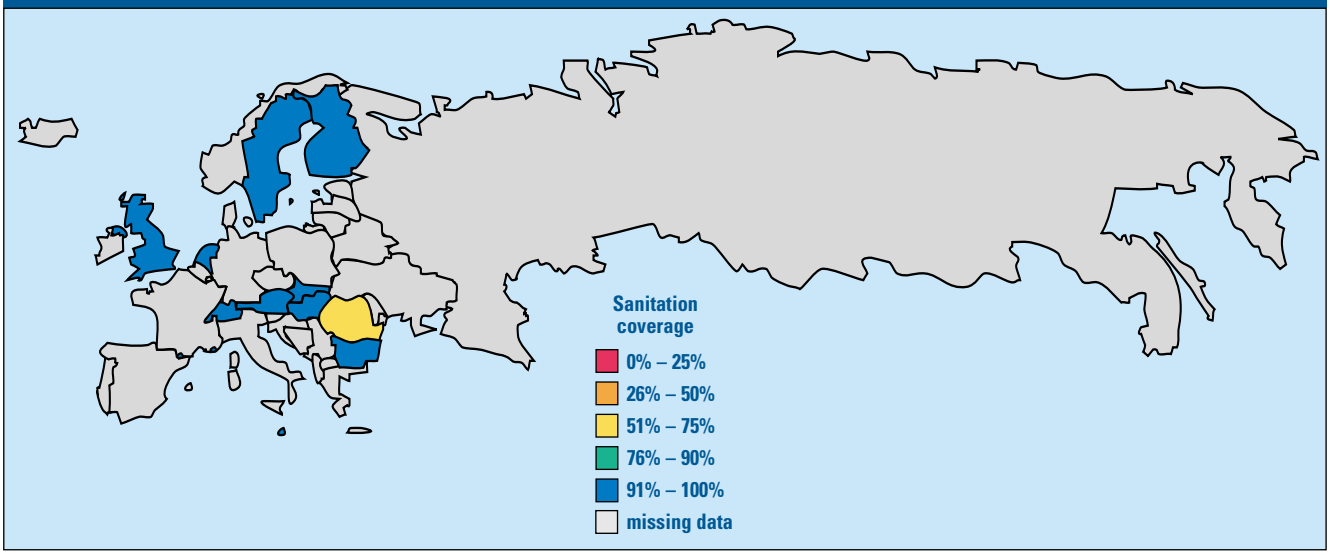
TABLE 10.2 EUROPEAN COUNTRIES NOT REPORTING FULL COVERAGE

Water supply		Sanitation	
Country	**Coverage**	**Country**	**Coverage**
Romania	58%	Romania	53%
Estonia	no data	Estonia	93% (urban)
Russian Federation	99%	Russian Federation	no data
Hungary	99%	Hungary	99%

MAP 10.1 EUROPE: WATER SUPPLY COVERAGE, 2000



MAP 10.2 EUROPE: SANITATION COVERAGE, 2000



10.3 Trends and future needs

There are insufficient data for 1990 to analyse any change over time. Data representing less than half of the region's population are available for 2000, and the data available for 1990 represent just 15% of the European population. The area of concern is eastern Europe and unfortunately the Assessment 2000 was not able to collect sufficient information for that area. It is therefore not possible to determine fully either the present coverage of the area, or any changes over time.

Figures 10.1–10.6 present the number of people with and without access to improved water supply and sanitation in 1990 and 2000. The projected populations for the years 2015 and 2025 are also presented, together with the international development targets in the sector (see also Table 5.1).

The low level of reporting in the Assessment 2000 within the European region makes it difficult to draw meaningful conclusions. As mentioned above, the part of the region on which most attention needs to be focused is eastern Europe. More information is needed on coverage levels, together with other data for the area.

It is predicted that the population of Europe will begin to decrease in the coming years, especially in rural areas. In urban areas, to meet the 2015 target of halving the proportion of people without access to water supply, it will be necessary to meet the needs of an additional 22 million people. The data available from the assessment suggest that this need is likely to be greatest in eastern Europe. The decline in the rural population of Europe suggests that, for the region as a whole, no additional numbers of people will require access to water supply and sanitation services in the future. In reality however, there may be a need to expand coverage to the unserved in some countries. For sanitation, an additional 25 million people will require access to services in urban areas.

Figure 10.1 Actual and target total water supply coverage for Europe

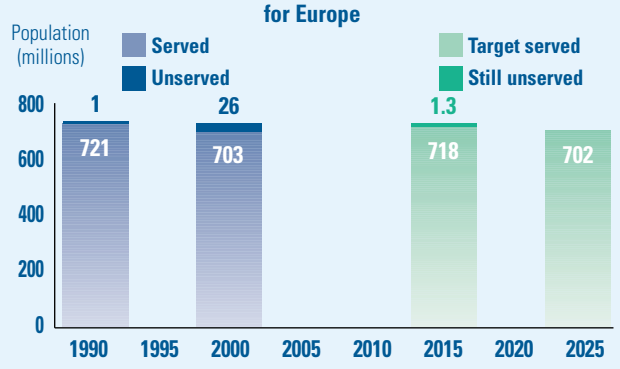


Figure 10.2 Actual and target urban water supply coverage for Europe

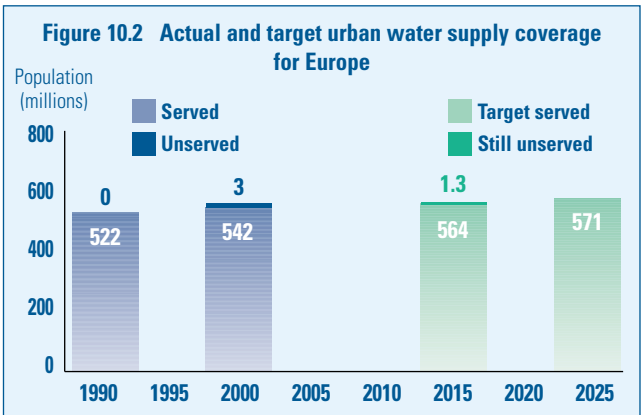


Figure 10.3 Actual and target rural water supply coverage for Europe

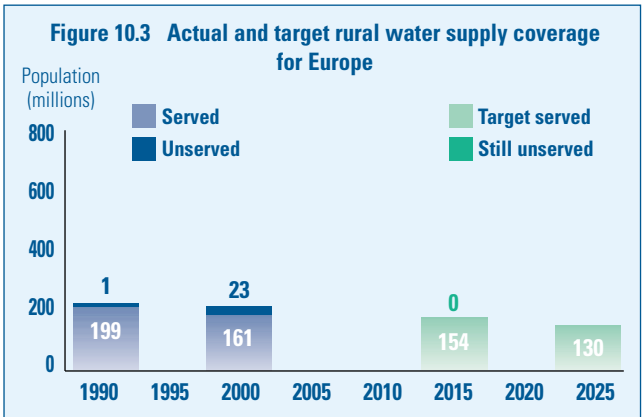


Figure 10.4 Actual and target total sanitation coverage for Europe

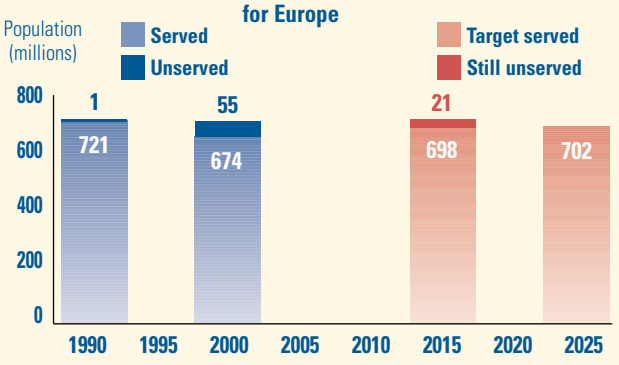


Figure 10.5 Actual and target urban sanitation coverage for Europe

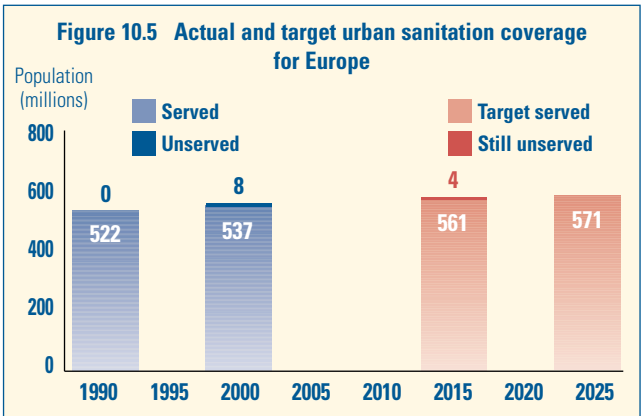
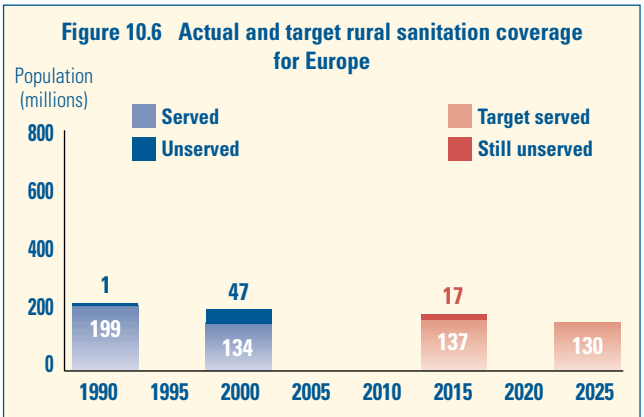


Figure 10.6 Actual and target rural sanitation coverage for Europe



11. Northern America

This chapter presents data for Northern America. Urban and rural water supply and sanitation coverage figures are shown by country, area or territory for both 1990 and 2000. Changes in coverage over time and projected changes in population are also briefly discussed.

11.1 Overview

Data representing 99.9% of the Northern American population suggest that 99.9% of the population in the region has coverage for both water supply and sanitation, the highest reported for any world region.

According to the results of the Assessment 2000, there is a negligible proportion of the global population without access to improved water supply and sanitation services in the Northern American region.

The region is comprised of only five areas: Bermuda, Canada, Greenland, Saint Pierre and Miquelon, and the United States of America. More than three out of four people in the region live in urban areas. Urban coverage of water and sanitation are both reported to be 100% of the population. Nevertheless, approximately 71 000 people in rural areas do not have access to either improved water supply or sanitation.

11.2 Water supply and sanitation coverage

Table 11.1 provides data for 1990 and 2000, by country, area or territory.

Coverage data are available for only two of the five areas in the region, Canada and the United States of America. Coverage is high for water supply and sanitation in these two countries, with only the rural areas of Canada reporting less than 100% coverage.

No map has been provided for Northern America, as data are only available for two countries. The data available for Canada and the United States of America suggest that coverage is very high and has remained so over the 1990s. Population projections for the region suggest that the urban population will continue to grow, while the rural population will decline. In terms of meeting sector targets, an additional 39 million people will need access to both urban water supply and sanitation by 2015, mainly because of population growth.

TABLE 11.1 NORTHERN AMERICA: WATER SUPPLY AND SANITATION COVERAGE BY COUNTRY, AREA OR TERRITORY, 1990 AND 2000

	Year	Total population[1] (thousands)	Urban population (thousands)	Rural population (thousands)	% urban water supply coverage	% rural water supply coverage	% total water supply coverage	% urban sanitation coverage	% rural sanitation coverage	% total sanitation coverage
Bermuda	1990	59	59	0						
	2000	65	65	0						
Canada	1990	27 791	21 283	6 508	100	99	100	100	99	100
	2000	31 146	24 017	7 129	100	99	100	100	99	100
Greenland	1990	55	44	11						
	2000	56	46	10						
Saint Pierre and Miquelon	1990	7	6	1						
	2000	7	6	1						
United States of America	1990	254 076	191 159	62 917	100	100	100	100	100	100
	2000	278 357	214 915	63 442	100	100	100	100	100	100

[1] Source *(10)*

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Annex A Methodology for the Global Water Supply and Sanitation Assessment 2000

Monitoring the population with access to improved drinking-water supply and facilities for improved sanitation has posed major problems. A review of water and sanitation coverage data from the 1980s and the first part of the 1990s showed that the definition of safe, or improved, water supply and sanitation facilities sometimes differed not only from one country to another, but also for a given country over time. Indeed, some of the data from individual countries often showed rapid and implausible changes in level of coverage from one assessment to the next. This indicated that some of the data were also unreliable, irrespective of the definition used. Furthermore, coverage data were based on estimates by service *providers*, rather than on the responses of *consumers* to household surveys, and these estimates can differ substantially. For example, public water utilities are unlikely to consider private household wells, and little may be known officially of householders' own sanitation facilities.

The Assessment 2000 marks a shift from gathering provider-based information only to include also consumer-based information. The use of consumer-based information was discussed in the previous Joint Monitoring Programme report.[1] The current approach aims to take a more accurate account of the actual use of facilities, and of initiatives to improve facilities taken by individuals and communities, which in some cases might not be included in official national water supply and sanitation statistics. By using household surveys, this approach also provides more information on breakdowns and service deficiencies, which might render the facilities unusable after they had been installed, and on service technologies. A drawback of this approach is that household surveys are not conducted recurrently in many countries. Another problem is the lack of standard indicators and methodologies, which makes it difficult to compare information obtained from different surveys.

Data collection

Data were collected from two main sources: assessment questionnaires and household surveys. Assessment questionnaires were sent to all WHO country representatives, to be completed in liaison with local UNICEF staff and relevant national agencies involved in the sector. Initially, assessment questionnaires were distributed with detailed instructions on the process by which it was to be completed. WHO staff (or, where appropriate, consultants or government officers) were requested to liaise with the local UNICEF country office and with the various national agencies involved in providing water supply and sanitation services.

Those completing the questionnaire were first asked to compile an inventory of existing population-based data on access to water supply and sanitation, particularly national census reports, Demographic Health Surveys (DHS) conducted by Macro International and funded by the United States Agency for International Development, and UNICEF's Multiple Indicator Cluster Surveys (MICS). The coverage figures returned by each country with the endorsement of government officials were to be based, as far as judged appropriate, on the estimates from such surveys and recent censuses.

[1] *Water supply and sanitation sector monitoring report - sector status as of 31 December 1994.* Geneva, World Health Organization, 1996 (WHO/UNICEF joint report).

Household survey results were collected and reviewed, including the DHS and MICS results. The DHS and MICS are national cluster sample surveys, covering several thousand households in each country. The samples are stratified to ensure that they are representative of urban and rural areas of each country. They collect information, at household level, on the main source of drinking-water used, as well as the sanitation facility. In most cases, each household is asked to identify the type of water source or sanitation facility they use from a list of technologies, such as piped in-house water supply, private well, borehole or protected spring. These surveys have therefore collected data from consumers on the faculties which they actually use, including those which they have installed themselves, such as private wells or pit latrines. Estimates by services providers often neglect to check that their facilities are functioning, let alone used; moreover, service providers are usually unaware of self-built facilities, or even systems installed by small local communities. Household surveys therefore provide an important step forward in obtaining more accurate coverage information for the sector.

Definitions of access

The following technologies were included in the assessment as representing "improved" water supply and sanitation:

Water supply	**Sanitation**
Household connection	Connection to a public sewer
Public standpipe	Connection to septic system
Borehole	Pour-flush latrine
Protected dug well	Simple pit latrine
Protected spring	Ventilated improved pit latrine
Rainwater collection	

The following technologies were considered "not improved":

Water supply	**Sanitation**
Unprotected well	Service or bucket latrines (where excreta are manually removed)
Unprotected spring	Public latrines
Vendor-provided water	Latrines with an open pit
Bottled water[2]	
Tanker truck-provided water	

[2] *Considered as "not improved" because of concerns about the quantity of supplied water, not because of concerns over the water quality.*

The assessment questionnaire defined access to water supply and sanitation in terms of the types of technology and levels of service afforded. For water, this included house connections, public standpipes, boreholes with handpumps, protected dug wells, protected springs and rainwater collection; allowance was also made for other locally-defined technologies. "Reasonable access" was broadly defined as the availability of at least 20 litres per person per day from a source within one kilometre of

BOX A.1 BOTTLED AND VENDED WATERS

In developing the methodology of the Assessment 2000 there was considerable discussion regarding the acceptability of sources such as bottled water and vendor-provided supplies (including tanker-truck supplies). These categories were considered inadequate. In some circumstances vendor-provided supplies may provide adequate minimum volumes although evidence suggests that this is rarely the case. The volumes secured from vendor sources may be severely limited by cost and experience suggests that water quality is often poor. Bottled water alone does not provide adequate volumes of water for domestic use and water for other domestic purposes must be secured from other sources. There may be circumstances in which the combination of readily available (but non-potable) water for domestic use, plus high quality and affordable bottled water for drinking, may be adequate. This combination of circumstances was not considered common and its omission is estimated to have had a negligible impact on regional and global statistics. The table below indicates the extent to which bottled, vendor-provided and tanker-truck water contribute to supply worldwide. It should be recalled that a large proportion of bottled water will be consumed by individuals who have access to improved water in their households.

Country	Year	Source of water	Percentage of the urban population that consumes bottled or vended water	Percentage of the rural population that consumes bottled or vended water
Angola	1996	Tanker truck	25.2	0.8
Cambodia	1998	Vendor	16	3.5
Chad	1997	Vendor	31.5	0.5
Dominican Republic	1996	Bottled water	37	6.3
Ecuador	1990	Tanker truck	16	7
Eritrea	1995	Tanker truck	30.5	1.4
Guatemala	1999	Bottled water	25.5	7.1
Haiti	1994	Bottled water	26	0.3
Jordan	1997	Tanker truck	1	10.6
Libyan Arab Jamahiriya	1995	Tanker truck	6.8	13.9
Mauritania	1996	Vendor	53	0.9
Mongolia	1996	Vendor	16	1
Niger	1998	Vendor	26.4	1.9
Oman	1993	Bottled water	39.5	42
Syrian Arab Republic	1997	Tanker truck	4.1	11.3
Turkey	1998	Bottled water/demi john	14.9	1
Yemen	1997	Bottled water	14.6	0.1

Source: JMP Databook 2000 (in press)

the user's dwelling. Types of source that did not give reasonable and ready access to water for domestic hygiene purposes, such as tanker trucks and bottled water, were not included (Box A.1). Sanitation was defined to include connection to a sewer or septic tank system, pour-flush latrine, simple pit or ventilated improved pit latrine, again with allowance for acceptable local technologies. The excreta disposal system was considered adequate if it was private or shared (but not public) and if it hygienically separated human excreta from human contact.

Access to water and sanitation, as reported below, does not imply that the level of service or quality of water is "adequate" or "safe". The assessment questionnaire did not include any methodology for discounting coverage figures to allow for intermittence or poor quality of the water supplies. However, the instructions stated that piped systems should not be considered "functioning" unless they were operating at over 50% capacity on a daily basis; and that handpumps should not be considered "functioning" unless they were operating for at least 70% of the time with a lag between breakdown and repair not exceeding two weeks. These aspects were taken into consideration when estimating coverage for countries for which national surveys had not been conducted. However, they were not taken into consideration when estimating national coverage using survey data, on which the report is primarily based.

In some regions, where higher levels of service were more prevalent, there was a tendency by national reporting authorities to set stricter requirements for access compared to other regions. These tendencies may be reflected in the data and should be taken into account when the national estimate is based exclusively on figures collected through the assessment questionnaire.

Definitions of urban and rural

The Assessment 2000 did not provide a standard definition of urban or rural areas. Instead, the questionnaire asked for the countries' own working definition of urban and rural. Similarly, when using household survey data, definitions predetermined by those responsible for the survey were accepted.

Data analysis

Electronic country files were prepared presenting all of the information collected from the global assessment questionnaire and existing survey data. The definitions of access to improved water supply and sanitation were consolidated across the two types of information source.

For each country, coverage estimates from surveys were plotted against the year in which the corresponding survey had been carried out. Four separate charts were used to show coverage by year in the period 1980–2000, one each for urban water, rural water, urban sanitation and rural sanitation. All other sources of data were also plotted in these charts for comparison and context, but were labelled differently. Some surveys were part of this latter category because the classification of sources or facilities was insufficient. Unfortunately, some surveys did not provide all of the information needed, not having been designed specifically to collect information about water and sanitation. For example, in many cases wells are reported without any indication of whether or how they are protected. The situation is often similar for springs.

For charts where coverage estimates from surveys were considered adequate, a line was drawn on each chart that, in the opinion of the review group, best fitted the survey estimates over the period 1990–2000. If the estimate from this best-fit line differed substantially from the 2000 estimate provided by the country, the country was asked to review its estimate in the context of the data displayed on the chart. The resulting discussions sometimes led to modification of the chart, sometimes to changes of the national estimate. Where no resolution could be obtained, the 2000 estimate derived from the survey data was used.

In a small number of charts there were insufficient survey data to derive a 1990 estimate. In these cases, an estimate for 2000 only was used. For countries where there were inadequate survey data, the national estimate for 2000 provided by the country was used.

Particular care was taken with the larger developing countries, as the conditions in those countries have a disproportionate effect on the global and regional averages. In particular, the 40 most populous developing countries – which account for some 90% of the population of the developing world – were the subject of special attention. These forty countries are:

Islamic State of Afghanistan
People's Democratic Republic of Algeria
Argentine Republic
People's Republic of Bangladesh
Federative Republic of Brazil
People's Republic of China
Republic of Colombia
Democratic People's Republic of Korea
Democratic Republic of the Congo
Arab Republic of Egypt
Federal Democratic Republic of Ethiopia
Republic of Ghana
Republic of India
Republic of Indonesia
Islamic Republic of Iran
Republic of Iraq
Republic of Kenya
Republic of Madagascar
Malaysia
United Mexican States
Kingdom of Morocco
Republic of Mozambique
Union of Myanmar
Kingdom of Nepal
Federal Republic of Nigeria
Islamic Republic of Pakistan
Republic of Peru
Republic of the Philippines
Republic of Korea
Kingdom of Saudi Arabia
Republic of South Africa
Democratic Socialist Republic of Sri Lanka
Republic of the Sudan
Kingdom of Thailand
Republic of Turkey
Republic of Uganda
United Republic of Tanzania
Bolivarian Republic of Venezuela
Socialist Republic of Viet Nam
Republic of Yemen

Methods for developing regional coverage figures

Estimates of percentage coverage for a region are based upon available data from the reporting countries in the region. When no data were available for countries in a region, estimates were extrapolated from countries in the region for which data were available. Such extrapolation, however, is used only to compute regional statistics: any country data reported in this assessment are based on reports for the country concerned.

In summary, while the type of water source and the type of excreta disposal facility can be associated with the quality of water and the adequacy of disposal, respectively, they cannot adequately measure population coverage of *safe* water or of *sanitary* excreta disposal. Hence, the coverage estimates presented in this report represent the population covered by *improved* water sources and *improved* sanitary facilities.

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