

## Freshwater: Latin America and the Caribbean

The Latin America and Caribbean Region is rich in renewable water resources with more than 30 per cent of the world's total. However, three hydrographic regions — the Gulf of Mexico Basin, the South Atlantic Basin and the La Plata Basin — covering 25 per cent of the region's territory, are home to 40 per cent of the population and contain only 10 per cent of the region's water resources (WWC 2000).

Most water-related problems transcend national boundaries although there are marked differences between sub-regions and countries. The major challenges are: decreasing per capita water availability due to population growth, urban expansion, deforestation and climate change; deteriorating water quality arising from untreated sewage, excessive use of fertilizers and pesticides, and industrial pollution — particularly from the mining and energy industries; and outdated institutional and legal frameworks.

### Availability and use

Water availability varies greatly, with South America being the richest sub-region. Some countries suffer from water shortages, and loss of aquatic biodiversity and habitats, with some Caribbean islands approaching or below water scarcity levels (WWC 2000). Sharp differences also exist within countries.

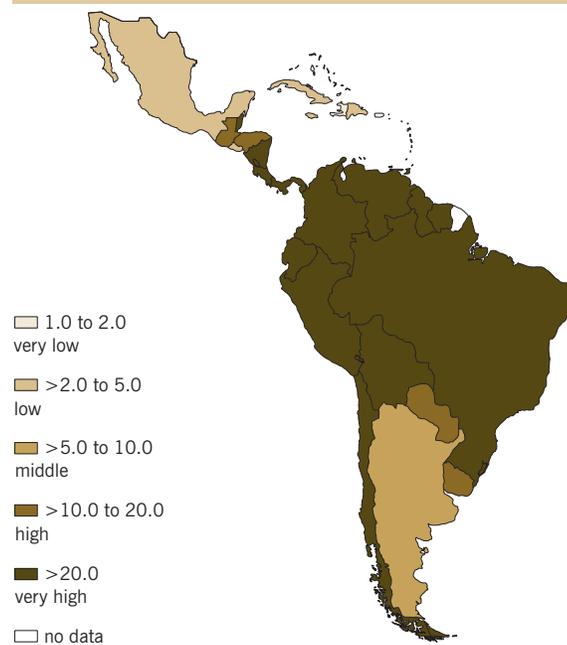
In most Caribbean small island states, rainfall is the sole source of freshwater (Antigua and Barbuda, the Bahamas and Barbados use desalinated water). In South America, groundwater reserves are of great importance and are estimated at 3 million km<sup>3</sup> (GWP 2000). Mexico is particularly dependent on groundwater, which accounts for one-third of all reported freshwater extraction and for two-thirds of urban drinking water (CATHALAC 1999, WWC 1999).

Agriculture and industry are the major consumers of water in the region, followed by domestic consumption. Irrigated agriculture is one of the fastest expanding uses of freshwater. The amount of land under irrigated agriculture increased from 10 million ha in 1970 to more than 18 million ha in 1998 (FAOSTAT 2001). Water withdrawals for irrigation range from 56 per cent of total withdrawals in the Caribbean to 78 per cent in Mesoamerica. There is a general lack of efficiency in irrigation technology and

practice (World Bank 1999). Some recent institutional reforms have attempted to address this. In Mexico, for example, ownership of public irrigation systems has been transferred to 386 Water User Associations resulting in a dramatic improvement in cost recovery, system maintenance, yield and water use efficiency (Saleth and Dinar 1999).

Industry also uses large amounts of water. In South America, it is estimated that annual industrial withdrawals reach 15 km<sup>3</sup> with 80 per cent of this demand coming from Argentina and Brazil alone

### Water availability in 2000 (1 000 m<sup>3</sup> per capita/year)



Map shows water availability measured in terms of 1 000 m<sup>3</sup> per capita/year

Source: compiled from UNDP, UNEP, World Bank and WRI 2000 and United Nations Population Division 2001

(ACAA 2001). In Brazil, virtually all the country's electricity comes from hydropower. The mining sector, especially in Chile and Peru, requires increasing quantities of water. For some regions such as the Andes, this may well lead to the need to import water in the near future. In Venezuela and Trinidad and Tobago, the petroleum sector is an important consumer.

The demand for water for domestic use is also on the increase. However, inequity among users, even in water-rich countries, is rampant. Many of the poor in both rural areas and urban communities have neither access to clean water nor sanitation services (WWC 2000). In 1995, 27 per cent of the population had

**‘In 1998, Hurricane Mitch caused US\$58 million of damage in Honduras alone. The devastation included the destruction of 85 000 latrines and 1 683 rural water mains. As a result, 75 per cent of the population — about 4.5 million people — lost access to drinking water. Devastation such as that caused by Hurricane Mitch may last for months or even years.’ —**

*WHO and UNICEF 2000*

either no domestic water supply or no easy access to it. In the same year, 41 per cent of the water was untreated and 31 per cent of the population had no sewage services (PAHO 1998). By 2000, 85 per cent of the population had an improved water supply and 78 per cent had improved sanitation coverage — but this still meant that 78 million people had no access to improved water supply and 117 million had no access to improved sanitation services (WHO and UNICEF 2000). Large disparities also exist between rural and

#### **The Tegucigalpa Model: water supply for peri-urban settlements**

Community participation, a cost-sharing and cost-recovery system, hygiene education and training have contributed to improving water supply and sanitation in many peri-urban communities in the Honduran capital of Tegucigalpa. Rapid urbanization over the past 20 years increased Tegucigalpa's population to 850 000, with more than half of the people living in 225 peri-urban communities. Surface water is almost non-existent, and groundwater is often too deep and polluted. The provision of basic services such as water and sewage systems is difficult and costly.

The programme on water supply for peri-urban settlements, which is a partnership involving UNICEF, with the National Autonomous Water and Sewage Authority (SANAA) Executive Unit for Settlements in Development (UEBD) and communities, provided water supply to 150 000 people in 80 communities and sanitation coverage to about 5 000 in four communities between 1987 and 1996. One of the strengths of the programme is community participation and investment. The community has to provide labour and construction materials, contribute financially through water tariffs and recover the full investment cost. The community must establish a Water Board to collect tariffs, administer the water system and take care of the operation and simple maintenance activities. A cost-sharing and cost-recovery system exists and this includes the use of a revolving fund: the community's contribution is about 40 per cent of the cost of the water system, while SANAA and UNICEF contribute 25 per cent and 35 per cent respectively.

*Source: UNCSD 1999*

urban areas. Natural disasters provide an additional, unexpected factor that can seriously undermine efforts to improve water and sanitation services.

Attempts have been made to improve water supply and sanitation in many urban areas and to set tariffs that reflect the real value of water. Although the efficiency of privatization and the use of economic instruments such as water pricing remain highly contentious (WWC 2000), some countries, such as Jamaica, have started using economic instruments (UNECLAC 2000).

Limited information on water utility infrastructure and operation is a major constraint in government efforts to improve regulations related to the urban water sector. While the role of governments has shifted from provider of a water service to regulator representing the public, many governments still do not have sufficient information on water utility operation, and this limits their regulatory functions. Although the rate of technological change in the water sector is generally slower than in other sectors, the need to transfer technology is critical to efforts to save water and introduce improved control strategies.

To increase the efficiency of the sanitation sector, as well as to attract capital, national and international initiatives have been suggested, including the creation of local or regional markets such as the Guarani Aquifer project (see box on page 169). In Brazil, there have been notable advances in legislation, especially with a 1997 federal law that put in place a national water resources policy and established a national water resources management system.

#### **Water quality**

Water pollution problems in Latin America and the Caribbean did not become a serious issue until the 1970s. Over the past 30 years, however, there has been a significant decrease in the quality of surface water and groundwater. Agriculture and the release of untreated urban and industrial sewage have become the major sources of pollution.

The excessive use of fertilizers in agriculture has enhanced algal growth and eutrophication in lakes, dams and coastal lagoons. Rising levels of nitrates have been observed in rivers, including the Amazon and the Orinoco, as well as in underground sources in the region. In Costa Rica, levels of nitrates approaching or surpassing international guidelines

### The Guarani Aquifer System

The Guarani Aquifer System is one of the world's largest aquifers, covering about 1.2 million km<sup>2</sup> in the southeast of South America. The permanent reserves of the system in Brazil are conservatively estimated at about 48 000 km<sup>3</sup> with an annual recharge of 160 km<sup>3</sup>. Groundwater extraction of about 20 per cent of current annual recharge rates would be enough to supply 300 litres per day per capita to 360 million inhabitants.

Argentina, Brazil, Paraguay and Uruguay are working together to develop an integrated plan for the protection and sustainable management of the system under a project funded by the Global Environment Facility and the World Bank — the Project for Environmental Protection and Sustainable Development of the Guarani Aquifer System. The Organization of American States, other international donors and agencies are also participating. Success would be an important step towards ensuring long-term availability of freshwater and aquifer resources for people in these countries.

have been found in both metropolitan and rural sources (Observatorio del Desarrollo 2001).

Untreated sewage from urban centres remains a major cause of pollution. In the region as a whole, only about 13 per cent of collected sewage receives any kind of treatment (PAHO 1998). Increasing pollution from urban run-off and the release of untreated sewage into water bodies serving urban areas has added to the difficulties of meeting the increasing

demand for water in cities, especially those located in areas such as Lima and Mexico City where water is scarce (WWC 2000).

Industrial activities, and the resulting pollution, have contributed substantially to water quality problems. Animal waste from tanneries, slaughterhouses and meat packing plants, for example, pollutes aquifers with coliform bacteria (WWC 2000).

Another water quality problem that is becoming more prevalent, especially in the Caribbean, is the salinization of water in coastal areas due to overextraction. This is particularly severe given the rising demand for water in the Caribbean, mainly to service the tourism industry (UNEP 1999).

### Institutional and legal frameworks

In most countries, water resources continue to be managed on a sectoral basis with little integration either between sectors or with other environmental management procedures. Such an approach ignores vital interactions with much wider ecosystems and other functions, and ecological services related to water. There has been a trend towards transferring water services from the public to the private sector during the past decade and to decentralizing legal and administrative responsibilities. As a result, laws and regulations designed to protect freshwater resources are often lacking or poorly enforced (WWC 2000).

### References: Chapter 2, freshwater, Latin America and the Caribbean

ACAA (2001). *Usos e Impactos Atlas Continental del Agua en America*  
[http://www.atlaslatinoamerica.org/usos\\_impac/amer\\_sur.htm](http://www.atlaslatinoamerica.org/usos_impac/amer_sur.htm)

CATHALAC (1999). *Vision on Water, Life and the Environment for the 21st Century. Regional Consultations. Central America and Caribbean*. Panama City, Water Centre for the Humid Tropics of Latin America and the Caribbean (CATHALAC).

FAOSTAT (2001). FAOSTAT Statistical Database. Food and Agriculture Organization  
[http://www.fao.org/ \[Geo-2-068\]](http://www.fao.org/ [Geo-2-068])

GWP (2000). *Water for the 21st Century: Vision to Action – South America*. Stockholm, Global Water Partnership South American Technical Advisory Committee

Observatorio del Desarrollo (2001). *El agua en Costa Rica: abundante pero vulnerable Boletín Información para la Toma de Decisiones*, Año 3, No. 6, Abril-Mayo

PAHO (1998). *Health in the Americas. Volume I, PAHO Scientific Publication No. 569*. Washington DC, Pan American Health Organization

Saleth, R.M. and Dinar, A. (1999). *Water Challenge and Institutional Response (A Cross-Country Perspective), Policy Research Working Paper 2045*. Washington DC, World Bank Development Research Group Rural Development and Rural Development Department

UNCSD (1999). *The Tegucigalpa Model: Water Supply for Peri-urban Settlements*. United Nations Commission for Sustainable Development  
[http://www.un.org/esa/sustdev/success/tegu\\_mod.htm](http://www.un.org/esa/sustdev/success/tegu_mod.htm)

UNDP, UNEP, World Bank and WRI (2000). *World Resources 2000-2001*. Washington DC, World Resources Institute

UNECLAC (2000). *Water Utility Regulation: Issues and Options for Latin America and the Caribbean*. ECLAC, LC/R. 2032. Santiago de Chile, United Nations Economic Commission for Latin America and the Caribbean

UNEP (1999). *Caribbean Environment Outlook*. Nairobi, United Nations Environment Programme

WHO and UNICEF (2000). *Global Water Supply and Sanitation Assessment 2000 Report*. Geneva and New York, World Health Organization and United Nations Children's Fund  
[http://www.who.int/water\\_sanitation\\_health/Globassessment/GlasspdfTOC.htm](http://www.who.int/water_sanitation_health/Globassessment/GlasspdfTOC.htm)

World Bank (1999). *Annual Review – Environment Matters*, Washington DC, World Bank

World Bank (2001). *World Development Indicators 2001*. Washington DC, World Bank  
[http://www.worldbank.org/data/wdi2001/pdfs/tab3\\_8.pdf \[Geo-2-024\]](http://www.worldbank.org/data/wdi2001/pdfs/tab3_8.pdf [Geo-2-024])

WWC (1999). *Vision on Water, Life and the Environment for the 21st Century. Regional Consultations: North America*. Marseille, World Water Council

WWC (2000). *Water in the Americas for the Twenty First Century, Roundtable Meeting of the Americas, July 26-28 2000, Final Report*, Montreal, World Water Council