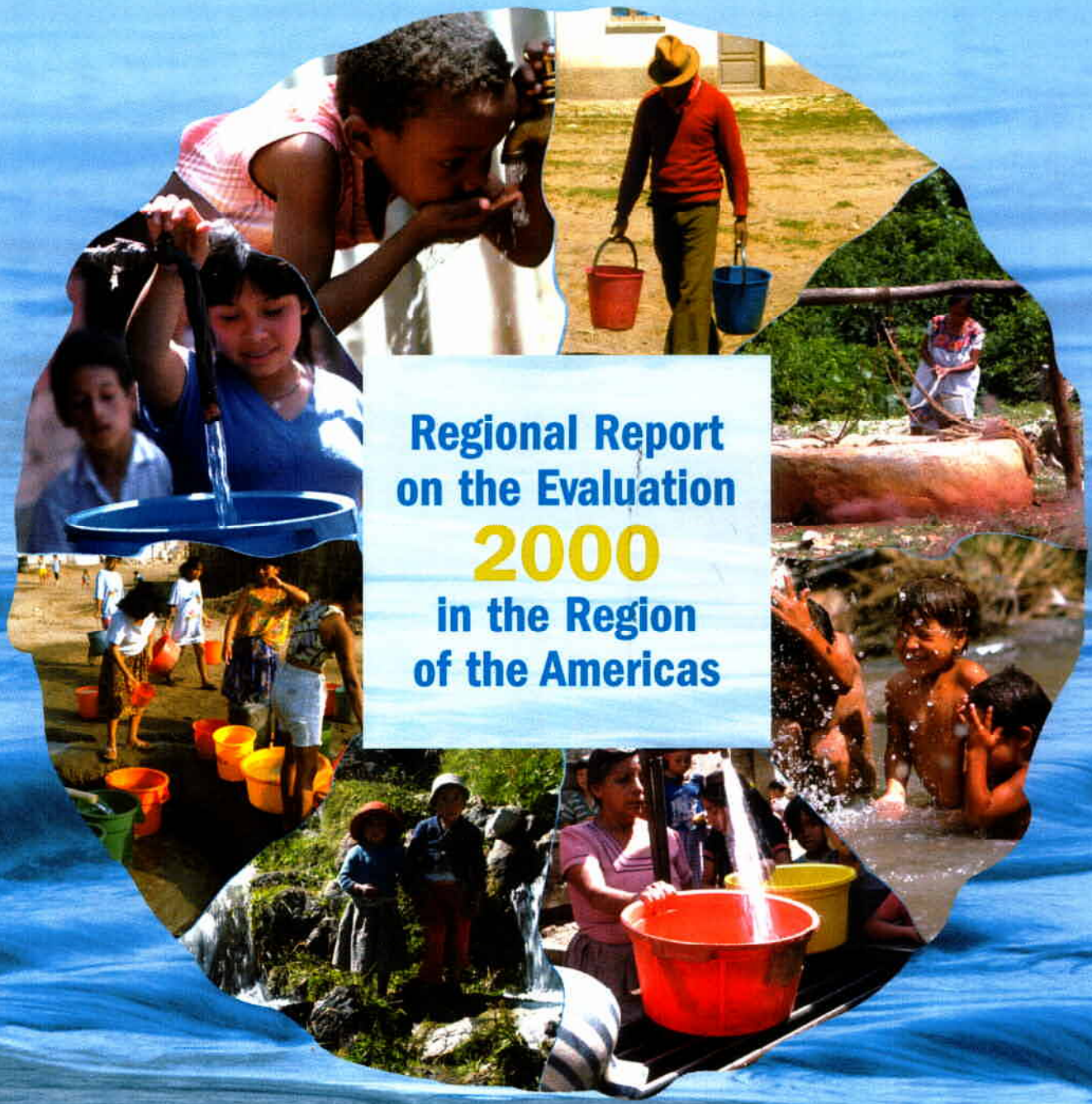

Regional Report on the Evaluation 2000 in the Region of the Americas

Water Supply and Sanitation • Current Status and Prospects

PAN AMERICAN HEALTH ORGANIZATION/DIVISION OF HEALTH AND ENVIRONMENT

PAN AMERICAN HEALTH ORGANIZATION
WORLD HEALTH ORGANIZATION

DIVISION OF HEALTH AND ENVIRONMENT

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Washington, DC, September 2001

REGIONAL REPORT ON THE EVALUATION 2000 IN THE REGION OF THE AMERICAS

Water Supply and Sanitation
Current Status and Prospects

PAN AMERICAN HEALTH ORGANIZATION (PAHO)
WORLD HEALTH ORGANIZATION (WHO)
Division of Health and Environment (HEP)

Washington D.C., September 2001

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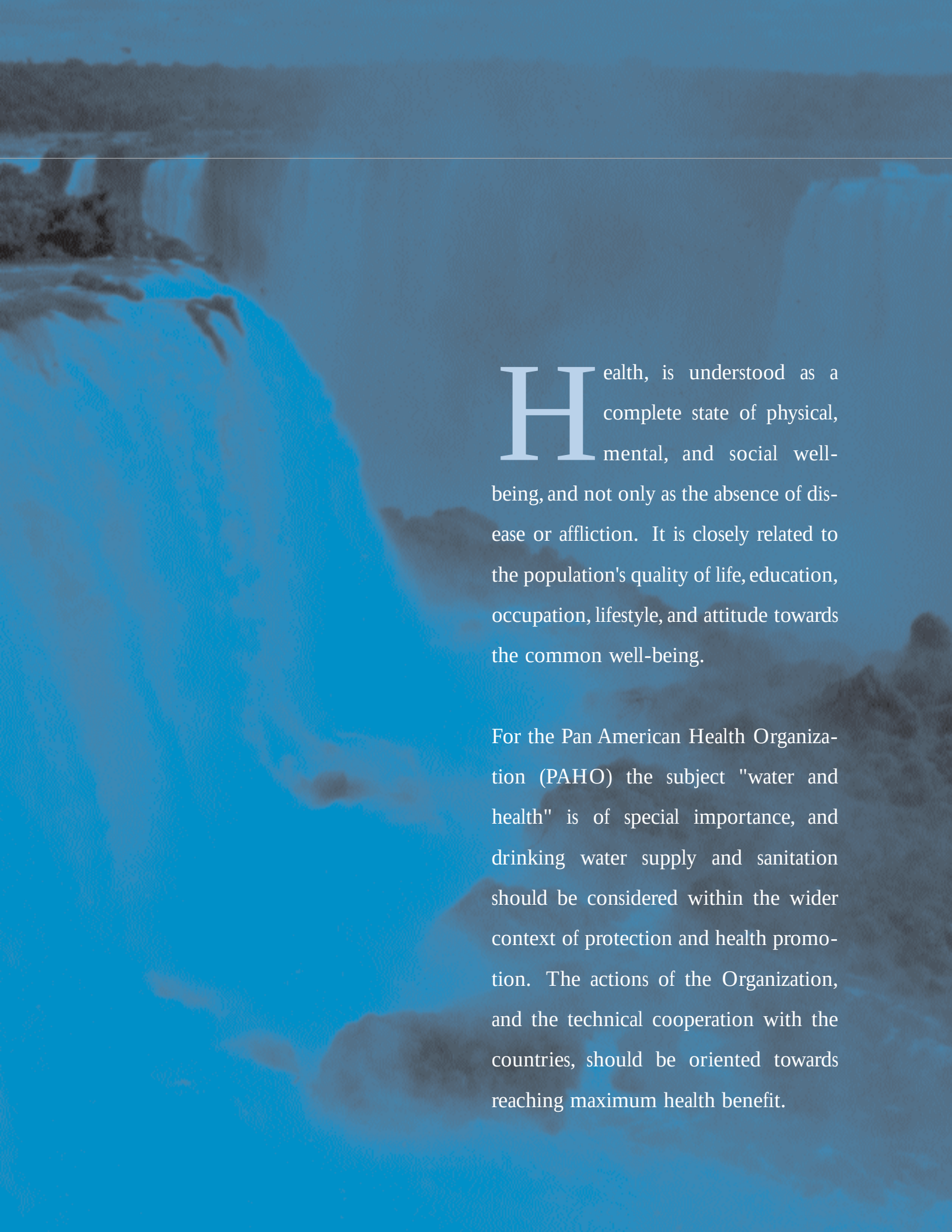


Health, is understood as a complete state of physical, mental, and social well-being, and not only as the absence of disease or affliction. It is closely related to the population's quality of life, education, occupation, lifestyle, and attitude towards the common well-being.

For the Pan American Health Organization (PAHO) the subject "water and health" is of special importance, and drinking water supply and sanitation should be considered within the wider context of protection and health promotion. The actions of the Organization, and the technical cooperation with the countries, should be oriented towards reaching maximum health benefit.

MESSAGE FROM THE DIRECTOR

Within this context, the quality of the environment in general, and the household in particular, has a relevant importance. Good environmental quality is closely linked to conservation and good management of the air quality, soil, and water resources. Similarly, the quality of the household environment basically depends on a good drinking water supply and sanitation service.

Unfortunately, in the Region of the Americas there is no equity in the access to, and use of, these services. At the end of the second millennium, some 26 million inhabitants of urban and peri-urban areas, and 51 million inhabitants of rural areas still lack drinking water services. A considerable percentage receives inadequate service with regard to access, continuity, and quality of drinking water. With regard to sanitation, the problem is even more troubling, since 37 million urban and 66 million rural inhabitants lack these basic services.

In Latin America and the Caribbean only 13.7% of the wastewater from 241 million inhabitants, whose dwellings are connected to sewerage systems receive some treatment, which means that the wastewater from 208 million inhabitants is discharged to the receptor bodies without treatment. This is very serious due to the widely identified health, ecological, and environmental problems it creates. In addition, it detracts from the image of the drinking water and sanitation service providers, which should be the principal party interested in the protection of the water resources, that constitute the raw material of the industry. If these entities deposit wastewater discharges without treatment into the bodies of receiving waters, they undermine the authority to promote control of industry discharges, from agroindustries, and other private enterprises.

PAHO considers it very important to maintain a permanent system to monitor and evaluate the situation of drinking water and sanitation in the Region of the Americas. As a result of the Evaluation 2000, carried out at the end of the second millennium, it was decided that a basis for this system should be organized. Consequently, a database was created at the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS). This database will permit the establishment of a permanent system that will monitor these services.

As with all databases, what is being offered to the countries is a frame of reference to organize and improve their own information systems. It should be taken into account that this is only the beginning, since the most important task belongs to the countries, which are responsible for periodically providing the required information.

George Alleyne
Director
Pan American Health Organization

PREFACE

A low cost, high quality, continuous and efficient drinking water and sanitation service at each home, village, and community fulfills a universal right and meets a basic human need.

In this context, the Evaluation of the Drinking Water and Sanitation Services in the Region of the Americas constitutes an important milestone for an effort that, although regional, has its own dynamic in each country. This document wishes to promote the implementation of sectoral studies in the countries, the preparation and implementation of national plans with criteria for efficiency and universal coverage, the use of appropriate technologies that simplify problem solving, and the progressive improvement of the infrastructure and quality of services.

The results of the evaluation demonstrate that there was progress, but there are still unfavorable conditions. Principally, there is a concern for related factors that hinder the reform and modernization of the sector and facilitate the existence of contrasts and inequities with regard to the services between urban, peri-urban, and rural areas. Furthermore, important changes have been observed in the countries, with strong tendencies to reduce the role of the state and to increase the participation of civil society, particularly those pertaining to private initiatives in the operation, maintenance and management of the drinking water and sanitation systems.

We wish to acknowledge those responsible for making this Evaluation 2000 possible in the countries of the Region of the Americas, especially the National Groups, PAHO/WHO Representative Offices, and UNICEF offices in these countries. Also we would like to acknowledge the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS) for its support in the Evaluation 2000 process and in facilitating the database, which was established and integrated into the Virtual Library in Health and Environment.

Mauricio Pardón
Director of the Division of Health and Environment
Pan American Health Organization

EXECUTIVE SUMMARY

This document presents an analysis on the results of the Evaluation of Drinking Water and Sanitation Services (Evaluation 2000) carried out in the Region of the Americas at the end of the second millennium. The Evaluation 2000 was developed in support of the countries, under the coordination of the Pan American Health Organization (PAHO). The data presented in the Evaluation 2000 corresponds to the year 1998.

The document describes the conceptual framework of the Evaluation 2000—from the process of retrieving information, including the strategies and procedures followed, forms utilized, and processing of the data—to the analysis and presentation of the results found.

With the experience gained from previous exercises in the Region, the Evaluation 2000 creates and incorporates analytical elements of great importance, such as the Analytical Country Reports. These reports describe the criteria and methodologies followed in their preparation, and is also included in the present Regional Report.

The Evaluation 2000 incorporates other elements of analysis and projection—generated and inspired during the process—such as the results of the study of available information and consolidation of the Analytical Reports of the Countries, the proposal of strategies for technical cooperation of PAHO for drinking water and sanitation for the future, and the study conducted on inequities in the access and use of the services that encompasses 11 countries of the Region, were also incorporated.

To record the information collected and analyzed in each country, the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS) created a Database on the Situation and Prospects of the Drinking Water and Sanitation Sector in the Region of the Americas at the end of the Second Millennium. This information is available on the WWW at CEPIS (http://www.cepis.ops-oms.org).

The analysis and processing of the available data, and a careful study of the Analytical Country Reports, provided a clearer idea of the evolution of the Drinking Water and Sanitation Sector in the countries of the Region in recent years, and especially, during the last decade.

In addition, an effort was made to determine the challenges facing the countries and the prospects in the delivery of these services at the beginning of the third millennium.

Because the Region of the Americas is diverse and extensive, it was decided that in addition to the analysis and observations consolidated regionally, there was a need to extend the analysis and specific observations on certain aspects for each of the six groups. For purposes of this report the Region was divided into the following groups:

Group I:	Canada and United States
Group II:	Brazil and Mexico
Group III:	Andean Countries
Group IV:	Southern Cone
Group V:	Central America, Hispanic Caribbean, and Haiti
Group VI:	English, Dutch and French Speaking Caribbean, Guyana and Suriname

Group I is made up of two highly developed countries, whose principal challenge is to maintain the total coverage and quality of the service achieved. A growing population and the progressive deterioration of water resources by pollutants, both biological and toxic substances, make it necessary to continually improve the processes of prevention and control of contamination, specifically the treatment of drinking water and wastewater. These two countries had not been included in the previous evaluations. However, their inclusion in this evaluation has been beneficial for the following reasons: (i) to have a complete vision of the sector throughout the Region; (ii) to have information on the situation of the sector in a group of developed countries that serves as pattern of comparison for the other groups of the Region; (iii) to identify the problems that are presented in the different stages of development, and (iv) to facilitate the exchange of technical and scientific information.

The other groups (II, III, IV and V) are made up of countries in less advanced development stages. None have achieved universal coverage. However, there are some that have made very important strides and others whose services have stayed rated in terms of their provision.

At the end of the second millennium, Latin America and the Caribbean had approximately 497 million inhabitants (there were 209 million in 1960). Some 131 million currently lack household connections to drinking water, 256 million lack sewage system connections and approximately 86 million are connected to sanitation systems with acceptable disposal. This deficient state of health still exists despite efforts to increase coverage during the decades of the sixties, seventies and eighties, and to improve the quality of the services, mainly in the 1990s, within the national policies established to combat the cholera epidemic that hit the Region during that decade.

The countries of group VI, for the most part, have achieved good coverage in drinking water and sanitation, with only a few lagging behind. In the majority of these countries, with little land area, the disposal of wastewater into the soil is a widespread practice, with the consequent danger of contaminating groundwater sources, a resource widely utilized in drinking water supply.

At the beginning of the third millennium, although the current political models do not produce convincing results in terms of the eradication of extreme poverty, the population of the Region of the Americas are conscious of the right for all to have access to basic sanitation and the importance of drinking water and sanitation services for health-subsequently they require immediate solutions. Although severe inequities persist in social development, reflected in access to, and use of, drinking water and sanitation services, there are some favorable factors. These include a higher degree of education, improvements in the efficiency and provision of services, environmental sanitary awareness and a greater number of professionals and technicians.

Evaluation 2000 revealed a new trend in the countries that is expressed in a demand by the society for greater participation and responsibility in the sector's problem solving. The aforementioned includes the operation and maintenance of the systems, which have traditionally been the responsibility of governments. Civil society—through private enterprise, or a mix of public/private associations within the organized community—constitutes a new element that facilitates the improvement of the quality of the services. In its capacity to regulate the services and make them accessible to the entire population, the state needs to strengthen the organizational and functional structures.

In addition, Evaluation 2000 ratifies the value of the sectoral analysis, its methodological development, and application in the Region. In the 1990's the sectoral analysis became a tool that provided the countries with a realistic view of the sector and its environment. It provided both the public and private sectors with a knowledge of the demands—both visible and non-visible deficits in coverage and

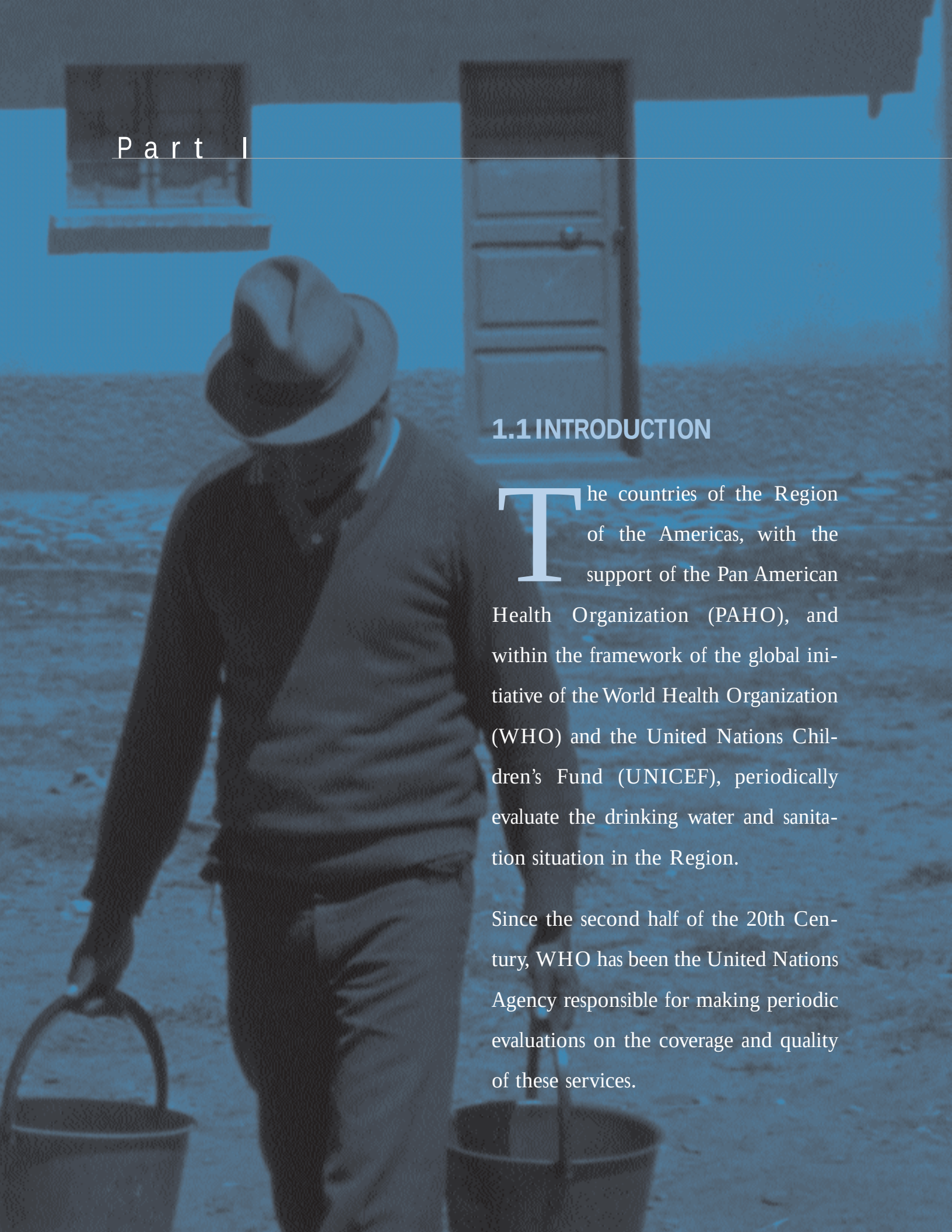
services, strengths and weaknesses of the institutions, as well as operational limitations regarding the regulation of the services and necessary resources.

The knowledge of the aforementioned reality is regarded as a basic element for political-institutional decision-making, oriented to the formulation and implementation of short, medium, and long-term action plans for sectoral development. The objective should be to emphasize an increase in the efficiency and quality of drinking water services, and in the collection, treatment, and sanitary disposal of wastewater.

Consequently, there is a need to continue with the implementation of sectoral studies in the countries, and the preparation and implementation of national plans in drinking water supply and sanitation that make it possible to reach the goal of universal coverage in the not so distant future.

ACRONYMS

AIDIS	Inter-American Association of Sanitary and Environmental Engineering
AIDS	Swedish Development Agency
ANDESAPA	Drinking Water and Sewerage Supply Association (Andean Countries)
AWWA	American Water Works Association (USA)
BNH	National Bank (Brazil)
BVSA	Virtual Library in Health and Environment
CAPRE	Coordination Committee of Water Supply and Sanitation Institutions (Central America, Panama and Dominican Republic)
CEPIS	Pan American Center for Sanitary Engineering and Environmental Sciences
CETESB	The Environmental Agency of the State of Sao Paulo (Brazil)
CNA	National Commission of Water (Mexico)
DANIDA	Danish Development Agency
DFID	Development Agency of England
DIGESA	Environmental Sanitation General Bureau (Peru)
FINIDA	Finnish Development Agency
GTZ	German Technical Cooperation Agency
HDI	Human Development Index (UNDP)
HEP	Division of Health and Environment (PAHO/WHO)
HES	Program of Basic Sanitation of the Division of Health and Environment (PAHO/WHO)
IBRD	International Bank for Reconstruction and Development (World Bank)
IDB	Inter-American Development Bank
IDWSSD	International Decade of Drinking Water Supply and Sanitation
NORAD	Norway Development Agency
PAHO	Pan American Health Organization
REPIDISCA	Pan American Network of Information in Environmental Health
SISAM	Inter-American Information System in Environmental Sanitation
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
WASA	Water and Sewerage Authority (Caribbean)
WEF	Water Environment Federation
WHO	World Health Organization
WWW	World Wide Web - Internet



Part I

1.1 INTRODUCTION

The countries of the Region of the Americas, with the support of the Pan American Health Organization (PAHO), and within the framework of the global initiative of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), periodically evaluate the drinking water and sanitation situation in the Region.

Since the second half of the 20th Century, WHO has been the United Nations Agency responsible for making periodic evaluations on the coverage and quality of these services.

THE EVALUATION PROCESS

Starting in 1990, after the World Summit for Children's Conference, UNICEF collaborated in this activity, allowing for a joint WHO-UNICEF effort.

In accordance with its strategies, PAHO supports the strengthening of drinking water supply and sanitation services and the evaluation of the existing situation in the countries, since it considers a solid and efficient sanitary infrastructure as fundamental for the achievement of the proposed health objectives.

1.2 BACKGROUND AND HISTORICAL RETROSPECTIVE

Since the 1960s WHO and PAHO have made periodic evaluations of the drinking water and sanitation sector. These evaluations are done every five years and serve as an important reference for elaboration of policies and actions for the sector at the global, regional and mainly at the national levels. The process of periodic evaluation of the drinking water and sanitation services in the Region of the Americas started in Latin America in the 1950s.

The United Nations Conference on Water, which took place in Mar del Plata, Argentina in 1977, served as a platform from which to launch the International Drinking Water Supply and Sanitation Decade (1981-1990). At this meeting WHO and PAHO played a leadership role, working jointly with the World Bank in developing a proposal that was subsequently adopted by the United Nations for the Decade of the 80's.

The conclusions of the evaluation for Latin America and the Caribbean of the International Drinking Water Supply and Sanitation Decade (IDWSSD) were presented and discussed at the Regional Conference on Water Supply and Sanitation, that was held in San Juan, Puerto Rico in September 1990. The recommendations of the aforementioned conference were consolidated into the so-called Declaration of Puerto Rico. The Conference recognized several limitations that affected the sector. It found out that in most countries there was inadequate organization and functional structure of the sector and provider agencies of the services, in particular, excessive division of responsibilities and duplication of functions, limited coordination and excessive centralization. Other limitations included difficulty in recovering investments and generating income through payment of services, which results in administrative deficiencies, loss and waste of water, lack of awareness of the intrinsic value of water, and lack of trained human resources.

The evaluation Report of the IDWSSD, the conclusions and recommendations of the Regional Conference were presented at the XXXV Meeting of the Directing Council (1991) of PAHO. It was requested that the Director of PAHO should continue to give priority to the development and efficient management of drinking water supply and sanitation services in the countries of the Region.

At the world level, one of the most important events held as a result of the global evaluation of the International Water and Sanitation Decade was the Global Conference on Drinking Water and Sanitation, which was held in New Delhi, India, and was promoted and coordinated by WHO. As a result of the Conference and with the consent of the countries the New Delhi Charter was approved. It recommended drinking water supply in sufficient quantities and sanitation for all by the year 2000.

After the World Summit for Children's Conference, an event equally significant in the past decade, UNICEF joined in the world effort to provide drinking water and sanitation services to all people. In this context WHO and UNICEF came together through the Joint Program for Monitoring (WHO-UNICEF) for Drinking Water and Sanitation, that has as its purpose the follow-up of the goals agreed upon by the countries, in the Conferences in New Delhi (WHO) and New York (UNICEF).

Considering that the decade of the 90s corresponded to the end of the millennium, WHO at the world level and PAHO at the level of the Americas, decided to carry out, with the collaboration of UNICEF, a broader evaluation than in previous years. The Evaluation 2000 is the response of the Region of the Americas to the global evaluation from the sector corresponding to the decade 1991-2000.

1.3 PURPOSE OF THE EVALUATION

In the Americas the Evaluation 2000 has been more ambitious than in previous years. In addition to the general evaluation of the situation of the services, it includes an analysis of the strengths and critical aspects of the sector, plans and strategies for the development of them, and prospects of the sector in the Region, and in the different countries, respectively. New technologies have been used, such as the Internet, and in general, the availability of equipment and analytical capacity of data processing and electronic communications in all the countries.

Among the purposes of the Evaluation 2000 are:

a) Support the countries in their diagnosis of the situation of the sector and in the preparation and implementation of directives for the attainment of plans, and projects aimed at achieving extension of coverage and improvements in the quality of these services in each country.
b) Create a permanent database with information on population, coverage, water quality and service, costs, required investments, among other parameters.
c) Prepare Analytical Reports on the situation, level of development and prospects of the drinking water and sanitation sector in each country of the Region.
d) Prepare a Regional Report based on the Country Analytical Reports, whose objectives are:
   i. Clarify and expand upon information required for the context of the Evaluation 2000, explaining aspects that have not been covered.
   ii. Provide an analysis of the data and information in order to establish priorities, identify problems, and make relevant recommendations to the objectives of the country, and when applicable, to sub-regional and regional objectives.
   iii. Identify possible trends at the sub-regional, and regional level of the country in order to determine the projections of PAHO technical cooperation in an effort to encourage investments in the sector.
e) Establish a strong reference base that supports improvement of information management systems for the drinking water and sanitation sector in the countries, and for the development and implementation of an Inter-American Information System in Environmental Sanitation (SISAM).
f) Contribute to the initiative coordinated by CEPIS, relating to the development and implementation of the Virtual Library in Health and Environment (BVSA).

1.4 METHODOLOGY

1.4.1 Directives of WHO

At the end of 1998, WHO and UNICEF, with the support of the London School of Hygiene and Tropical Medicine organized a meeting in Geneva, to present and discuss with the representatives of the Regional Offices of WHO, the methodological pro-

posal to be utilized in the Evaluation 2000. As a result of this meeting it was agreed that 14 questionnaires would be used for the collection of information on the situation of the sector.

The information would not only be on coverage of drinking water and sanitation in the countries, but also on type of technology, prospects for the development of the sector, treatment of wastewater, quality and efficiency of the services, health aspects, and public/private mix in the delivery of the services. It would also include relevant information for the sector, such as the situation of the services in the large metropolis, with emphasis on urban-marginalized areas. The countries at the world level adopted the questionnaires.

1.4.2 Consensus-building and Regional Coordination

In order to adapt procedures and standardized concepts to the reality of the Region of the Americas four sub-regional coordination meetings were held, to present and discuss the methodological directives of WHO for the Evaluation 2000, and the questionnaires agreed upon during the meeting in Geneva. The sub-regional meetings resulted in an agreement on the structure and content of the Country Analytical Reports, and achieved by consensus, a program of activities and strategy for the development of the Evaluation 2000 consistent with the reality of the Region.

The first two coordination meetings were held in March, at CEPIS, Lima, Peru. The first meeting brought together the countries of the Southern Cone: Argentina, Brazil, Chile, Paraguay, and Uruguay; the second meeting included the countries of the Andean Region: Bolivia, Ecuador, Peru, Venezuela, and the Dominican Republic. The third meeting took place in San José, Costa Rica and grouped the countries from Central America, Mexico, Colombia and the Hispanic Caribbean. The fourth and final meeting held in April, took place in Saint Lucia and brought together the countries of the English, French, and Dutch speaking Caribbean, Belize, Guyana, Haiti, and Suriname.

1.4.3 The Evaluation 2000 in the Countries

The Evaluation 2000 was carried out in each country with the assistance and technical support of a National Evaluation Coordination Group (National Committee). This committee included representatives from the national authorities for the sector, associations of users and service providers, and from institutions of national planning, sectoral development, and statistics, among others.

PAHO assigned the adviser in Health and Environment in each country of the Region as the individual responsible for the general coordination and development of the Evaluation 2000.

With a view to maintaining concepts and procedures, and to facilitate quality control of the evaluation process, a special section was installed in the website of CEPIS (http://www.cepis.ops-oms.org) for the entry and validation of data of the Evaluation 2000. The 14 questionnaires were incorporated with instructions and terms of references for the preparation of the Analytical Reports.

The development of the Evaluation 2000 consisted of four stages. The first stage was the establishment of national groups responsible for providing technical and logistical support to the evaluation process, as well as validating the information and results of the same. The Evaluation 2000 database at CEPIS registers names and addresses, including Internet, of all the participating national groups.

The second stage referred to the recovery of information, and did not involve the generation of primary data through field visits, surveys, censuses and other means of investigation, but was limited to data collection and collection of information already existing in the countries. The task was carried out through consultations with various sources, such as, documents and reports of entities of the sector and government institutions, results of household surveys, applied research and Sectoral Analysis or other pertinent studies conducted in the sector. The data utilized for the Evaluation 2000 correspond to the year 1998.

The third stage, collection of information from each country was done electronically through the website of CEPIS. The National Committee of each country, with the support of the Adviser in Health and Environment of the PAHO/WHO

Representative Office, participated in the collection of information and validation of the requested data.

The fourth stage, analysis and processing of the information were carried out for the preparation of the Country Analytical Reports. These activities took place in each country, according to the terms of references that are shown in Annex II. The Analytical Country Reports were prepared based on the information contained in the database from CEPIS, and complemented with other aspects.

It is noteworthy that few countries, such as:
- Aruba
- Bermuda
- Cayman Islands
- Jamaica
- Martinique, and
- Netherlands Antilles

did not provide the required information, thus population data was taken from PAHO's publication "Health Situation in the Americas–Basic Indicators 1998."

The population data from:
- Canada
- El Salvador
- French Guyana
- Haiti
- Honduras
- Panama
- United States and
- Uruguay

have been adjusted for 1998, stemming from growth rates reported by each country in questionnaire Form 6 of the Evaluation 2000.

With regard to service coverage for:
- Aruba (drinking water) and
- Jamaica (drinking water and sanitation)

data available from WHO was used, and have been estimated utilizing the information on household surveys.

Colombia, which did not report on drinking water coverage with easy access and sanitation with *in situ* systems, information from WHO household surveys was also used.

1.4.4 Regional Consolidation

The Program of Basic Sanitation (HES) of the Division of Health and Environment (HEP), PAHO, was the technical unit responsible for coordinating the Evaluation 2000 in the Region. In order to meet those responsibilities a staff member was designated as being responsible for the design and implementation of a control system, and for verification of any inconsistencies in data and information. This was done through comparison of external and historical sources, and continuous communications among the countries and Regional Coordination. In addition, HEP continuously maintained a monitoring process in order to detect and correct any inconsistencies in information submitted by the countries.

For the preparation of this Regional Report, basic data existing in CEPIS website were utilized, and results are reflected in the country analytical reports.

At the same time that the Evaluation 2000 was being carried out, studies were also being conducted to identify and analyze inequities in access, use and expenditure of drinking water, with information obtained from household surveys carried out between 1995 and 1999. The studies on

inequities have been a joint initiative of the Division of Health and Human Development (HDP) and HEP, with the support of the PAHO/WHO Representative Office in Peru and were carried out in the following 11 countries:

- Bolivia
- Brazil
- Chile
- Colombia
- Ecuador
- El Salvador
- Jamaica
- Nicaragua
- Panama
- Paraguay and
- Peru

The 11 studies on inequities, databases, indicators of the situation of the services, and the country analytical reports, allowed for the creation of a Consolidated Report on inequities in access, use and expenditure of drinking water. This report presented a comparative analysis of the problems in the countries. The studies on inequities produced within the framework of the Evaluation 2000 are also available on the web page http://www.cepis.ops-oms.org.

The Regional Report on the Evaluation 2000 has been prepared by the Regional Coordination established at PAHO/WHO Headquarters, in Washington, DC.

1.5 GLOSSARY

Drinking water supply	System or service of water collection, drinking water treatment, and water distribution for human consumption.
Access to nearby public water source	Widely understood as the availability of 20 liters average drinking water by person per day, obtained from a public source of drinking water, located up to a kilometer from the user's house.
Drinking water	Healthy water, pleasant and innocuous for the human being and fulfills quality standards established by the countries.
Sewage system	System or service of collection, transportation, treatment, and sanitary disposal of wastewater.
Coverage	Quantity or percentage of population that has a service.
Commercial	Related to activities of billing and collection of services.
Household connection of drinking water	The point of water installed within the residence or in one private parcel, regardless of the source or method of extraction.
Household sewerage connection	Exit housing pipes, with the objective of discharging the excreta and wastewater to the sewerage system.
Contamination	Presence of undesirable substances in the environment.
Institutional development	Planned process of change for the strengthening of the institutions and of the national capabilities.
Disinfection	Process to which is submitted the water in order to eliminate pathogens.
Domestic	Related to homes.
Evaluation	Process to identify a situation or existing reality.
Adequate human excreta disposal	Individualized sanitation service or shared human waste disposal, that separates the excreta of the contact with the people.
Global	Referred to all the terrestrial globe (definition of the UN).
IDH	Human Development Index.
Site	Community area.
Pathogens	Microorganisms that could make the human being ill.
Physical losses	Missing water of pipes and overflows of storage or distribution tanks.
Commercial losses	Unaccount-for-water, produced water with cost not recovered.
Peri-urban	Close to the city, around the same.
Treatment plant	Site designated to carry out several processes of treatment or of wastewater treatment.
Urban population	Population that live within the urban centers according to criteria specific to the countries.
Rural population:	Population that live outside the urban centers according to country criteria.
Regional	Referred to one of the five regions (UN) of the world, of which the Americas constitutes a region.
Sewerage system	System of pipes for the wastewater collection and removal.
Reuse	Use of the same water more than once.

Sanitation	Services or systems of collection, transportation, treatment, and sanitary disposal of wastewater, excreta or other waste.
Sanitary	Appropriate from the standpoint of health protection and of conservation of the environment.
Sectoral	Related to the drinking water and sanitation sector.
Service	Related to drinking water supply, collection, treatment and sanitary disposal of wastewater and excreta.
System	Set of elements, components, or things that interact in order to achieve a common objective.
Drinking water systems with easy access	Systems or services that include the following and that are shared by users outside housing: • public sources • wells with handpumps • protected dug well • protected springs • rainwater collection
***In situ* sanitation systems**	Systems or services that includes any of the following technologies: • connection to septic tanks • latrines with water discharge • dry latrines (of ventilation improved) • simple pit latrines
Toxic substances	Substances of non-biological origin, present in the water, with capacity to be absorbed, to penetrate into the body, capable of causing various organic and functional alterations in the human being.
Treatment	Set of processes to which is submitted the water in order to achieve a sanitary objective.

Part II

2.1 THE POPULATION OF THE AMERICAS

The Region of the Americas includes countries with different levels of development, some highly developed that belong to the group of the eight more developed countries of the world, others in intermediate stages of development, and others still developing.

The Region of the Americas is characterized by its ethnic, religious and cultural diversity. This includes people of all the races of the world, as well as

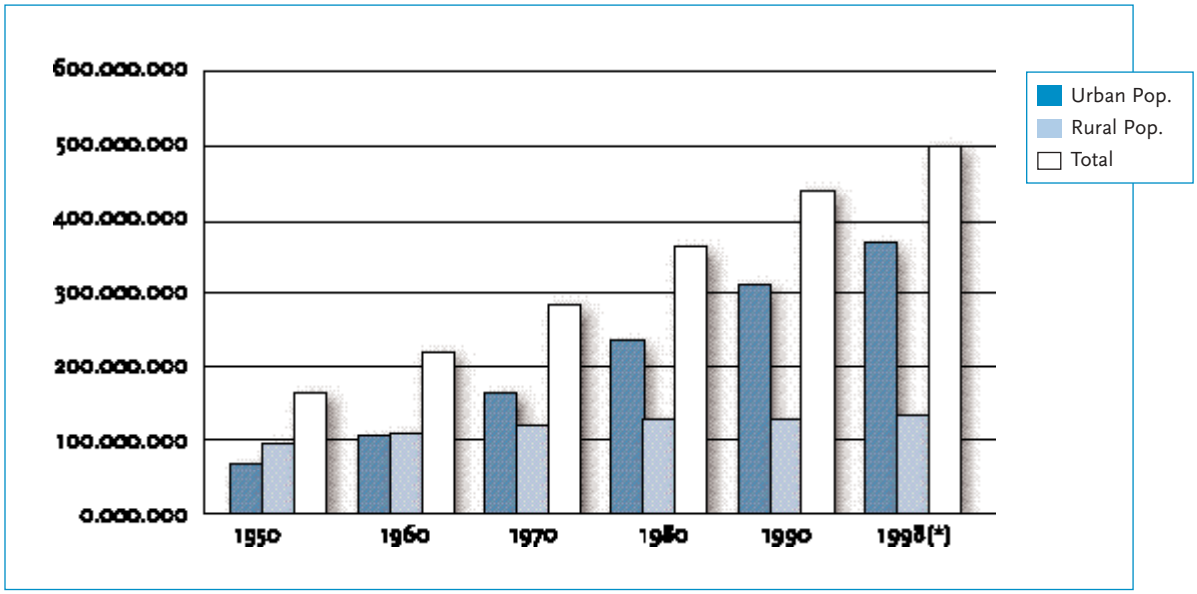
REGIONAL SITUATION

representation of almost all the religions and cultures of the planet.

The Region has experienced considerable population growth, doubling in the second half of the 20th Century, going from less than 400 million inhabitants in 1950 to 790 million at the end of 1998, and more than 800 million inhabitants in 2000.

An important characteristic of regional demography is that it constitutes continuous migration of the rural population toward the cities, which at the end of the 1990s has resulted in the population of the Americas being characterized by the predominance of urban population over the rural (Figure 1).

FIGURE 1. Region of the Americas:
Evolution of Urban and Rural Population in Recent Decades



The displacement of the population from rural areas to the city has been motivated basically by models of development, violence and localized conflicts, and by the progress of agricultural technology, which has diminished the demand for rural labor. This, despite the existence of a growing population that requires more food, and more importantly, for the economy of some countries, which depend on the export of food and agricultural products. Industrialization and economic development in general have increased the demand of workers in the cities. Unfortunately, not all displaced persons from the rural areas to the cities have rapidly achieved improvement in their quality of life.

During the second half of the 20th Century, marginalized urban areas, known in different countries by names such as slums, districts, new towns, shantytowns, among others, developed as a problem in large and many medium cities of Latin America. These marginalized areas, for the most part consisting of people displaced from the rural areas, have grown very rapidly, creating complex social, economic, and sanitary problems. It has been very difficult to provide these population with drinking water supply and adequate sanitation services. Although large investments have been made in sanitary services, the benefits achieved by the population in these areas though improved, in many cases have been less than expected, due to steady growth, and in some instances, the explosive expansion of these marginalized areas.

The lack of full employment among many of the inhabitants of these marginalized areas, has made the recovery of costs of services more difficult, which results in deficient operation and maintenance of the systems, and most serious, the postponement of investments in rural areas. This is due to the limited resources from the State for the sector, and the tendency to utilize these resources by the urban population which has more political strength and access to the decision-making level than the rural population.

Population displacement has not only occurred in terms of rural and urban environment, but also in terms of developing countries toward the most developed and rich countries. In addition, this population displacement phenomenon has also been affected by the occurrence of belligerent conflicts, as is the case in some countries of Central America and in Colombia, South America.

The Evaluation 2000 attempted to collect data that could characterize the problems of providing drinking water and sanitation services in urban-marginalized areas of large and medium cities, but unfortunately it was not possible to separate information on the urban perspective.

Table 1 includes population data from the 48 countries and territories that constitute the Region of the Americas at the end of 1998.

2.2 SITUATION OF DRINKING WATER AND SANITATION SERVICES IN THE AMERICAS

The evaluation of drinking water and sanitation services, carried out by the countries, under the regional coordination of PAHO, indicate significant progress in the delivery of these services in the Region of the Americas. However, in Latin America and the Caribbean significant challenges related to improvements in the efficiency and quality of the delivery of the services still persists. This is a situation that deserves serious attention since these services constitute a key element for health sustainability and for a better quality of life for the population.

Some countries of the Region, among them, the United States and Canada have been able to achieve and maintain universal coverage in the delivery of drinking water and sanitation services. However, the authorities of these two countries face growing problems, which originated with the prevention and control of environmental pollution, mainly related to chemical substances.

In accordance with the data and information on the Evaluation 2000, the population of the Americas stands at 790,039 million people and the coverage of drinking water and sanitation through household connections is 82.96% and 59.08%, respectively.

Latin America and the Caribbean, currently has a population of 497,329 million people, 84.59% of the

TABLE 1
Population in the Region of the Americas – December 1998
(Population in thousands)

Country/Territory	Urban Pop.	% Urban	Rural Pop.	% Rural	Total Population
Anguilla	9	100.00	0	0.00	9
Antigua and Barbuda	42	60.00	28	40.00	70
Argentina	32,481	88.80	4,097	11.20	36,578
Aruba	72	100.00	–	0.00	72
Bahamas	248	83.22	50	16.78	298
Barbados	270	100.00	–	0.00	270
Belize	120	50.36	118	49.64	239
Bermuda	64	100.00	–	0.00	64
Bolivia	4,770	60.00	3,180	40.00	7,950
Brazil	126,773	78.36	35,017	21.64	161,790
Canada	23,959	78.76	6,462	21.24	30,421
Cayman Islands*	34	100.00	0	0.00	34
Chile	12,723	85.27	2,197	14.73	14,920
Colombia	28,719	70.44	12,050	29.56	40,769
Costa Rica	1,440	43.11	1,901	56.89	3,341
Cuba	8,376	75.20	2,762	24.80	11,138
Dominica	19	26.76	52	73.24	71
Dominican Republic	5,261	64.01	2,958	35.99	8,219
Ecuador	7,635	62.71	4,540	37.29	12,175
El Salvador	3,125	50.75	3,032	49.25	6,157
French Guyana	123	79.78	31	20.22	154
Grenada	9	9.12	91	90.88	100
Guadaloupe	423	100.00	0	0.00	423
Guatemala	3,879	34.98	7,209	65.02	11,088
Guyana	180	24.00	570	76.00	750
Haiti	2,615	33.81	5,119	66.19	7,734
Honduras	2,788	46.55	3,201	53.45	5,989
Jamaica	1,270	49.61	1,290	50.39	2,560
Martinique	371	94.60	21	5.40	392
Mexico	70,459	73.55	25,338	26.45	95,797
Montserrat	5	100.00	0	0.00	5
Netherlands Antilles	138	70.20	60	29.80	198
Nicaragua	2,514	53.62	2,175	46.38	4,690
Panama	1,525	55.21	1,237	44.79	2,762
Paraguay	2,905	53.74	2,500	46.26	5,405
Peru	16,970	68.42	7,831	31.58	24,801
Puerto Rico	3,702	95.61	170	4.39	3,872
Saint Kitts and Nevis	34	100.00	–	0.00	34
Saint Lucia	147	100.00	0	0.00	147
Saint Vincent and the Grenadines	62	54.80	51	45.20	113
Suriname	297	69.48	130	30.52	427
Trinidad and Tobago	1,249	100.00	0	0.00	1,249
Turks and Caicos Islands	20	80.00	5	20.00	25
United States of America	185,592	70.76	76,691	29.24	262,283
Uruguay	2,919	90.80	296	9.20	3,215
Venezuela	18,889	89.51	2,213	10.49	21,102
Virgin Islands (UK)	19	100.00	–	–	19
Virgin Islands (USA)	49	45.90	58	54.10	107
Total	**575,447**	**72.84**	**214,592**	**27.16**	**790,039**

Sources: Assessment 2000 **Health Conditions in the Americas - Basic Indicators 1998*

population has drinking water services, either with connection or with easy access to one public source.

Comparing the evolution of these services in Latin America and the Caribbean with other regions of the world during the last three decades, the coverage situation could be considered reasonably acceptable. However, in terms of universalization of coverage, the absolute numbers are troubling, when taking into account the fact that 76,540 million people (15.41%) do not have access to some form of reliable drinking water without health hazards. In addition, some 53,908 million people (10.86%) are supplied through systems defined as "easy access", if hygiene, sanitary surroundings and health education are taken into account, then these systems represent for the most part, a significant health risk, mainly for the most vulnerable populations, such as children and the elderly.

In addition, it is estimated that in Latin America and the Caribbean, more than 219 million people which represent 60% of the population served through household connections are served by operationally intermittent water supply systems. These systems constitute a latent danger for the users, with the possibility of being exposed to diarrheal diseases and other water-borne diseases, considering that the control, surveillance, and certification of the quality for these systems are almost nonexistent in the Region.

In the Region of the Americas total drinking water coverage, including household connections and easy access systems is 90.30%, while in Latin America and the Caribbean the total coverage is 84.59%, with 92.98% coverage in urban areas and 61.22% in rural areas. This reflects a real inequity of access, where the percentages of population without drinking water services are five times higher in the rural areas than in the urban areas.

The problems of delivery of services are more serious in peri-urban areas, mainly in the poverty belts that are being created around the large cities of Latin America and the Caribbean, due to rural migration.

In the rural areas of Latin America and the Caribbean, with regard to drinking water supply, the solutions are still directed almost exclusively toward engineering problems and to the selection and use of appropriate technology to the environment. The process includes mobilization and community participation, usually as a cost reduction option of local labor supply, without providing a comprehensive view of the operation of the systems and the long-term problems of operation and maintenance of installations.

In this context, in the rural environment, the results in terms of functionality of the infrastructure, lead to solutions with systems categorized by the community in many cases as "second class".

Since 1991, after the reappearance of cholera in the Region of the Americas, a majority of the countries have increased the monitoring of drinking water quality and improved its control, in particular the disinfection of water distribution systems. In addition, in Latin America attempts have been made to introduce the disinfection of water at the household level where there are no collective public supply systems, or where they function intermittently. In accordance with a study conducted by CEPIS, in 1994, it was estimated that only 59% of the population of Latin America and the Caribbean received regularly disinfected water. In 1995, 23 countries of this region notified that the majority of the people that lived in urban communities received water in accordance with WHO guidelines for drinking water quality. However, the same does not apply to rural areas.

Although the disinfection of the drinking water systems has progressed, in accordance with what was previously indicated many problems still need to be resolved. These include the lack of continuous chlorine, the operation, and inadequate maintenance of the systems at the local level, which have been, and continue to be, obstacles to ensuring quality water for all populations on a continuous basis.

In Latin America and the Caribbean, only 241,311 million people, 48.61% of the population, are connected to conventional sanitary sewerage systems and 151,921 million people, 30.60% of the population, are served by *in situ* sanitation systems, such as latrines, septic tanks, among others. In addition, it is estimated that 103,237 million people, 20.79% of the population of Latin America and the Caribbean,

do not have systems for the elimination of wastewater and excreta, of which 37,054 million (10.15%) are in urban areas and 66,183 million (50.41%) in rural areas.

Consequently, the great challenge is related to the need for increase coverage in sanitation services, and improvements in the efficiency of sanitary sewerage systems and alternative *in situ* technological models. The lack of wastewater treatment continues to be one of the most serious sanitary problems in the Region, mainly in the Caribbean. The Evaluation 2000 indicates that only 13.7% of the wastewater collected by the few existing sewerage systems are treated. The situation becomes even more troubling since regional experts have indicated that the efficiency of these treatment systems is very low.

The problems related to treatment and adequate disposal of urban wastewater are quite complex, and present a great challenge for governments of the developed countries of the Region. In developing countries, the high costs of conventional treatment installations, operation and maintenance represent a serious obstacle. The alternative is the utilization of low-cost technologies that provide adequate solutions to the problem.

In the Americas, *in situ* disposal corresponds to 51.60% of rural areas, which could be considered adequate, but 26.97% corresponds to urban areas, which should be considered inadequate due to the problems of soil and groundwater pollution resulting from the presence of larger populations in urban areas.

There are several sites where the nitrogen content of the groundwater has increased to very high values due to the abuse that has resulted from *in situ* wastewater disposal in urban areas.

It is obvious that this situation deserves very special attention, by the serious risks that it represents to human health and for the preservation of environmental quality. It is especially noteworthy in a part of the Region where incidence of high levels of gastrointestinal diseases persist, including cholera, as well as the increase in toxic substances, industrial waste and the generalized use of toxic agricultural chemicals. Added to this is the problem of observed deficiencies in wastewater treatment and in the operation and maintenance of sanitation systems.

With regards to the regional sanitation problems, several critical areas have been identified and are still not resolved. These include insufficient political support of governments for pertinent sectoral institutions, a lack of sanitary awareness among the population, and the need to change the methodologies and criteria used for financing installations necessary for wastewater treatment. Other issues include inappropriateness of environmental policies, institutional deficiencies and the need to formulate technological standards, and appropriate engineering for the elimination of waste.

2.3 EVOLUTION OF THE COVERAGE OF DRINKING WATER AND SANITATION SERVICES

Since the 1950s, evaluations of the drinking water and sanitation sector in the Region of the Americas have been carried out every ten years, with some intermediate evaluations.

The process of periodic evaluation of drinking water and sanitation services in the Region of the Americas started in Latin America in the 1950s. Subsequently, the English-speaking Caribbean, Guyana and Suriname were included. The existing information on this sub-region makes it possible to do a special analysis.

Considering that the decade of the nineties corresponded to a change of century, it was decided at the end of the millennium that the scope of the evaluations should be expanded beyond previous evaluations, that is the object of this report. At the same time it was deemed necessary to include a permanent database that could continuously show and update the information.

In general, the evaluations show a growth in population and coverage for Latin America as observed in Table 2. During the second half of the 20th Century the population of the Region doubled, growing from less than 400 million inhabitants in 1950 to more than 800 million in the 2000.

TABLE 2
Evolution of Coverage in Drinking Water and Sanitation in Latin America and the Caribbean
(Population in Millions)

Year	Total	With Water*		With Sewerage **		With Latrines or Septic Tanks		With Some Degree of Sanitation	
1960	209	69	33%	29	14%	N.D.	–	N.D.	–
1971	287	152	53%	59	21%	N.D.	–	N.D.	–
1980	339	236	70%	95	28%	105	31%	200	59%
1990	429	341	80%	168	39%	116	27%	284	66%
Eval. 2000	497	420	85%	241	49%	152	31%	393	79%

* With household connection or easy access.
** Only sewerage, for the most part of the cases without treatment of effluents.

Table 2 shows a steady growth of the population served and an increase in the percentage of coverage in water and sanitation in Latin America and the Caribbean. It should be noted that in 1991 a cholera epidemic occurred in this region, after more than a century without this disease. This phenomenon forced countries to give special importance to drinking water quality. Traditionally, in Latin America priority had been given to the coverage aspects of water quality and services. It is possible that the importance that was given to improvements in water quality, disinfection and sanitation at the beginning of the 1990s; was due in part to reorientation in allocation of the investments toward the aforementioned parameters, at the expense of resources previously devoted to increasing coverage in water. This would explain the slower increase in these aspects in the decade of 1990.

The information from Table 2 was used to prepare Table 3, which indicates the population without drinking water and sanitation in Latin America and the Caribbean.

TABLE 3
Population without Water and some Degree of Sanitation in Latin America and the Caribbean
(In Millions)

Year	Total	Without Access to Drinking Water		Without Some Degree of Sanitation		Sewerage Without Effluent Treatment	
1960	209	140	67%	N.D.	-	N.D.	-
1971	287	135	47%	N.D.	-	N.D.	-
1980	339	103	30%	139	41%	N.D.	-
1990	429	88	20%	145	34%	150	90%
Eval. 2000	497	77	15%	103	21%	208	86%

FIGURE 2. Latin America and the Caribbean
Drinking Water Coverage: Year 1998

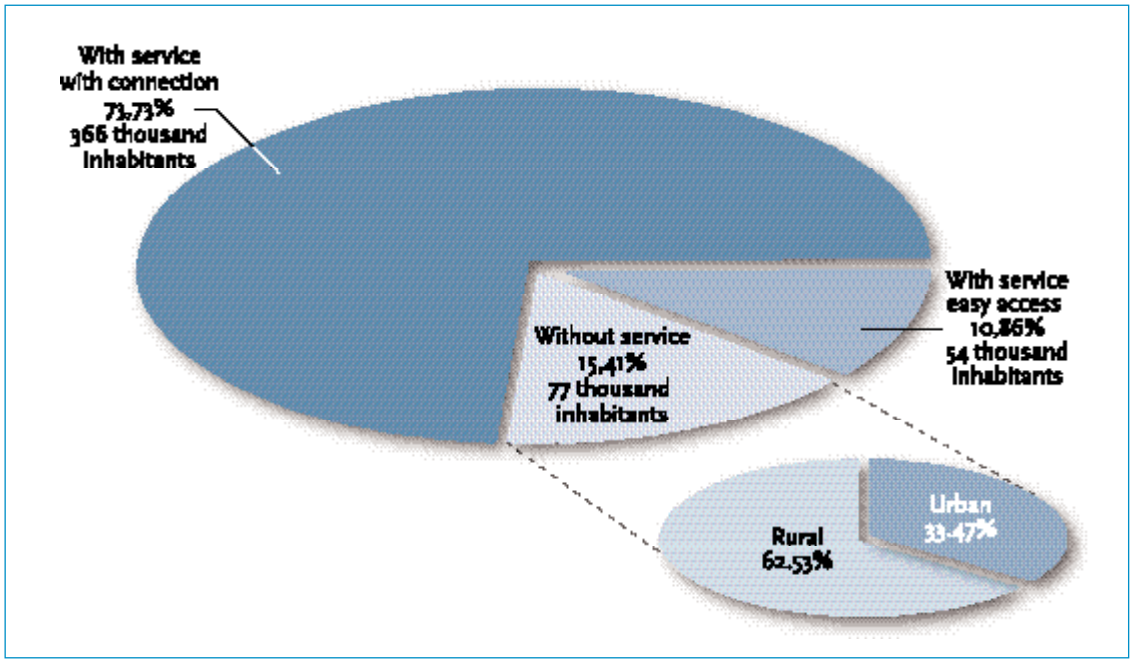


FIGURE 3. Latin America and the Caribbean
Drinking Water Coverage: Year 1960

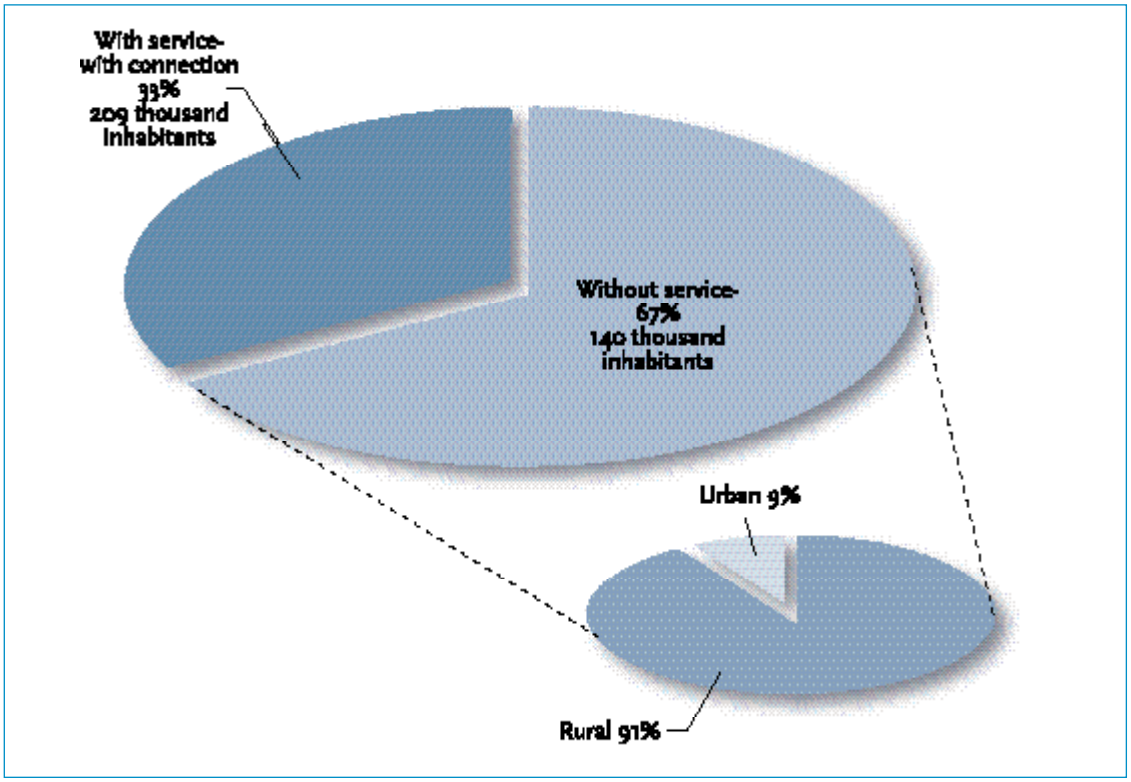


FIGURE 4. Population Served: Drinking Water and Sewerage in Latin America and the Caribbean Years 1960-2000

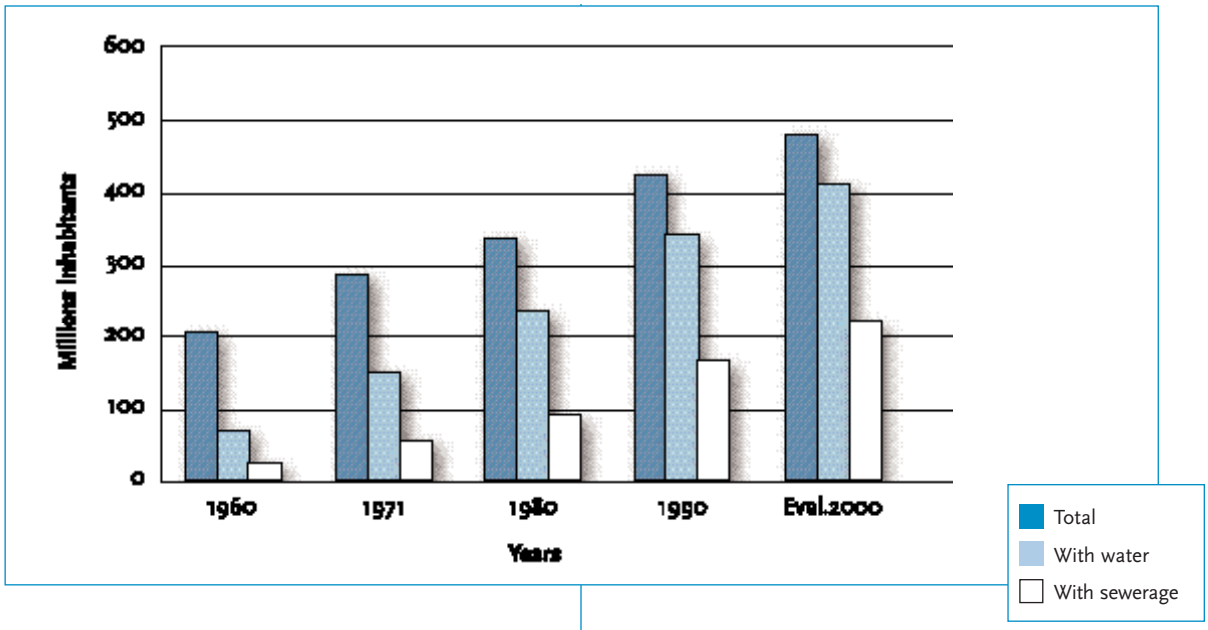
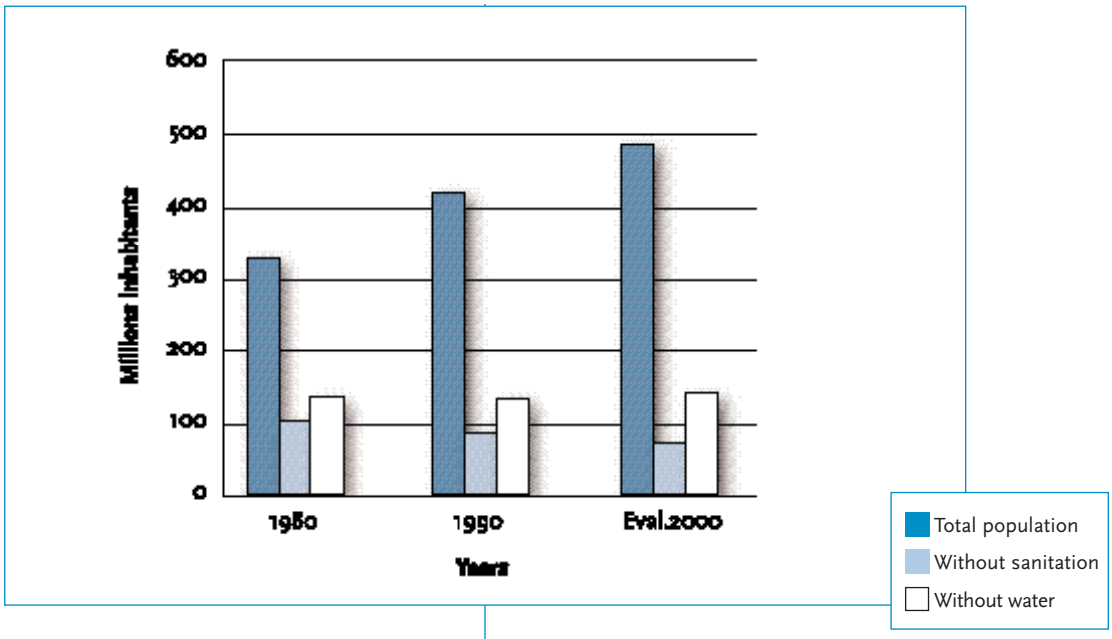


FIGURE 5. Population without Drinking Water and Sanitation service in Latin America 1980–2000



It is noteworthy that some criteria had to be adapted in order to standardize the information presented in the Evolution of Coverage of Drinking Water and Sanitation Services. Below are the principal differences encountered:

- The criteria for what characterizes urban and rural are not uniform throughout the evaluations. In the Evaluation 2000, significant differences were still confirmed. Some countries consider as rural, populations with less than 5,000, 2,000, and 1,000 inhabitants. Others consider political-administrative capitals as urban, regardless of its size.
- The definitions referring to drinking water supply systems as "Easy Access" and "*in situ*" sanita-

tion systems throughout the evaluations have not been uniform. In the Global Evaluation 2000, WHO regards "Easy Access" as a service that can provide at least 20 liters per inhabitant per day of innocuous water to 1 kilometer. In the Region of the Americas the majority of the countries have established stricter criteria to consider easy access, which usually can be 400 meters and 200 meters of distance, and provisions of 40-50 liters per inhabitant per day.

- While many countries consider population served, as all individuals that have household connections, others consider that this is not "served" if the water is of poor quality and does not meet drinking water standards, although it has household connection.
- Some countries consider as served or with easy access the population that is receiving concentrated solutions of chlorine in order to disinfect water. Others consider that these are only temporary measures carried out to address the problem of lack of service of adequate reliable water, and do not include this population as served.
- Many countries consider that the population connected to a sewerage system is cleaned up although the wastewater is not being treated. Others make a differentiation between the terms "with sewerage" and "with sanitation", where "with sanitation" means, "with wastewater treatment."
- Several countries regard wastewater disposal and urban "*in situ*" excreta as an acceptable sanitation solution although phosphorus and nitrogen compounds are increasingly contaminating groundwater.

Because of the difficulties in establishing criterion compatible to the countries, comparisons of the results of this evaluation with those of previous years are not precise. However, the information provided by the countries makes it possible to establish a baseline for future monitoring of the sector through a database system that will be continually updated by the countries.

In the Region of Latin America and the Caribbean, increase in the coverage of water supply and sanitation in urban areas implies the expansion of the infrastructure and improvements in operational conditions of existing installations. In many cases the installations for water supply, lines of management, pumping stations, treatment plants, tanks and networks of distribution need rehabilitation and expansion. Old pipes frequently present serious problems of losses that can only be solved by replacement.

With regard to sewerage systems, increase coverage implies the expansion of the infrastructure, networks, and treatment installations. Urban growth in many cities of the Region have resulted in sanitary sewerage systems which are obsolete, and incapable of coping with the growing quantity of domestic wastewater and industrial effluents. Studies conducted in the Region indicate that a large number of wastewater treatment installations are abandoned or function precariously.

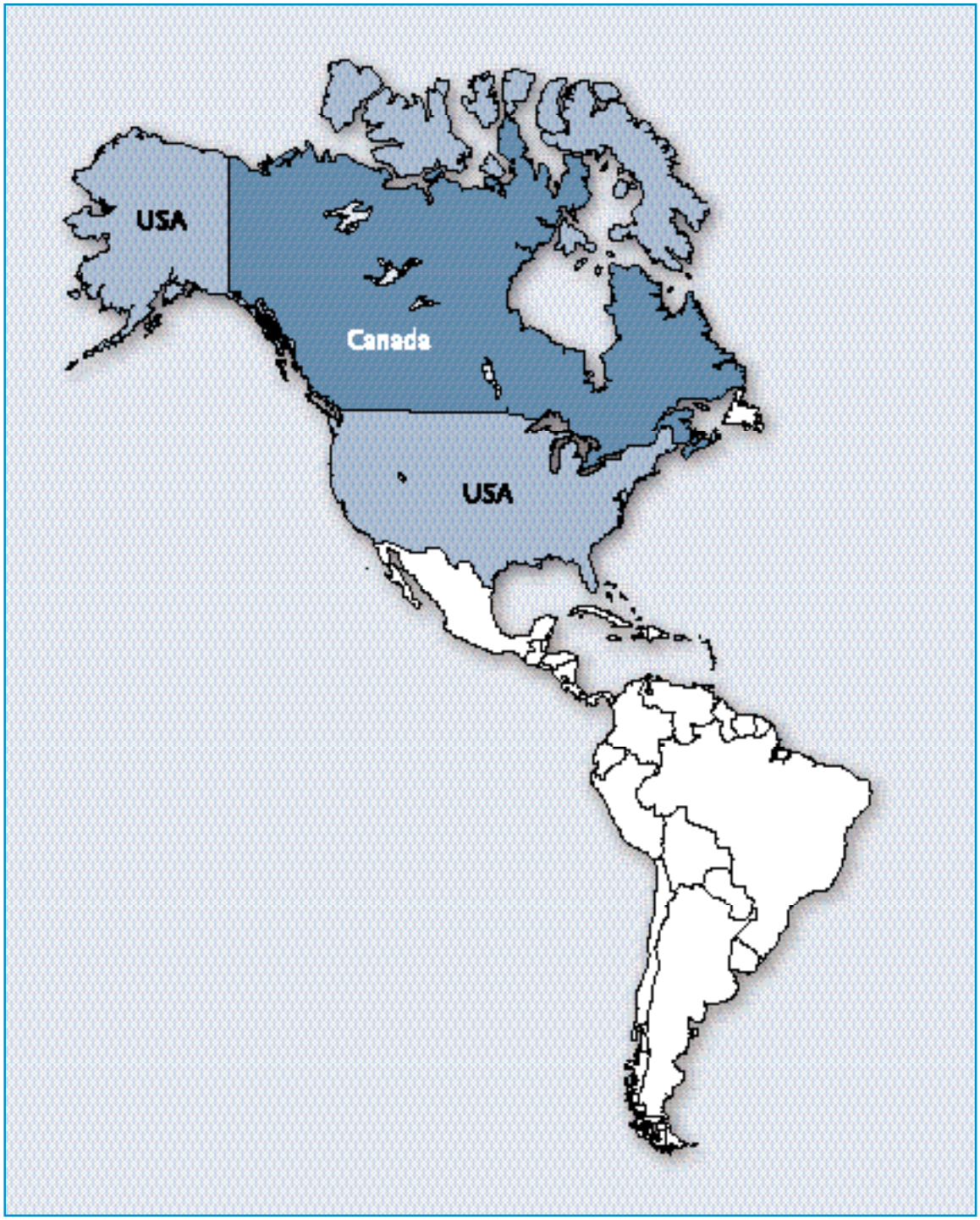
In expansion and rehabilitation projects high-priority is based on the availability of financial resources and operating capacity for its planning and execution.

In the countries of the Region serious deficiencies still exist in the operation and maintenance of installations and equipment. This causes interruptions in service, losses in the distribution systems, disinfection failure, and faulty meters, all of which contribute to the efficiency of the service and the quality of the water made available to the users. The problem of losses in the distribution systems is often one of the causes for the lack of water in outlying areas, which has great impact on the financial imbalance of the institutions due to the quantity of unrecorded water. In addition, operation and maintenance deficiencies are observed in the sewerage systems, resulting in obstructions, overflowing in inspection wells and interruptions in the operation of pumping stations.

In order to analyze the situation of the services in the Region of the Americas in a more detailed approach, countries were divided into six different groups. With a view to facilitating the analysis, the countries in each group present similar characteristics in the evolution and development of the sector.

Group I

Highly developed countries with total coverage: Canada and the United States of America.



Group II

Countries in intermediate stage of development, with intermediate coverage, that by dimension is advisable to analyze independently of smaller countries: Brazil and Mexico.

Group III

Countries of similar characteristics, considered in several studies as a sub-region of PAHO. This group is made up of the Andean countries: Bolivia, Colombia, Ecuador, Peru, and Venezuela.

Group IV

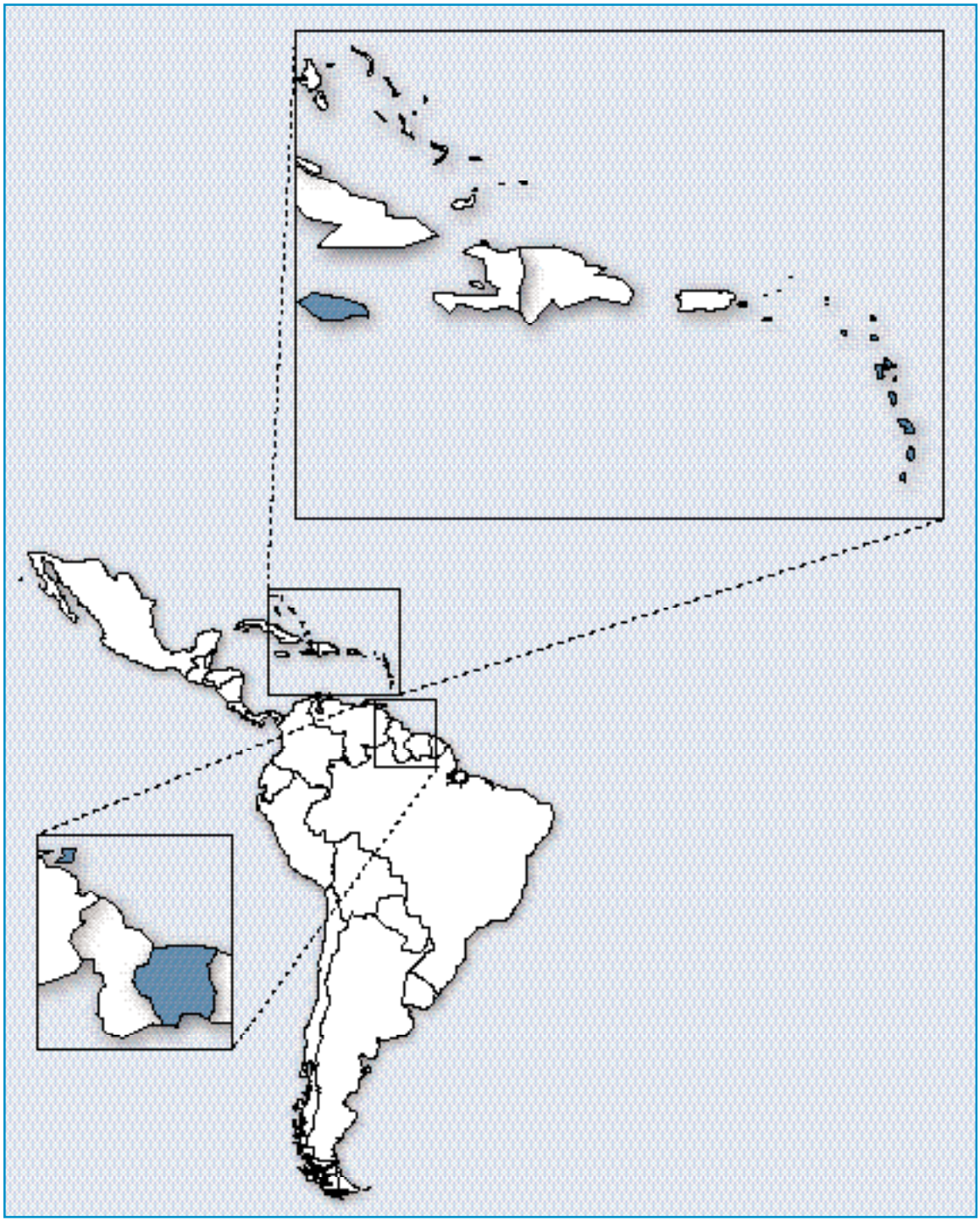
Countries of similar characteristics, considered in several studies as a sub-region of PAHO. This group is made up of countries that form the Southern Cone: Argentina, Chile, Paraguay, and Uruguay.

Group V

Countries of similar characteristics, considered in several studies as a sub-region of PAHO. This group includes Central America, Hispanic Caribbean, and Haiti: Belize, Costa Rica, Cuba, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Panama, Puerto Rico, and the Dominican Republic.

Group VI

Participating countries of the Caribbean basin. This group is represented by the countries of the English, French and Dutch Speaking Caribbean, Guyana and Suriname: Anguilla, Antigua and Barbuda, the Netherlands Antilles, Aruba, Bahamas, Barbados, Bermuda, Dominica, French Guiana, Grenada, Guadeloupe, Cayman Islands, Turks and Caicos Islands, British Virgin Islands, Virgin Islands of the United States of America, Jamaica, Martinique, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago.



2.4 INEQUITIES IN ACCESS AND USE OF DRINKING WATER SERVICES IN LATIN AMERICA AND THE CARIBBEAN

Inequity in the delivery of basic services, particularly drinking water supply, among the most economically disadvantageous groups is of great concern in the countries.

Information available on drinking water services does not include aspects related to the existing inequities, except in some countries where there is relation to distribution by major geographical regions, including urban, rural and large metropolitan areas. In addition, the data available from operating agencies and institutions that regulate and control the services does not make it possible to conduct deeper studies that include distributive aspects in accordance with income or expenditures and other socioeconomic variables.

While the Evaluation 2000 was being carried out, a study using the multiple purpose household surveys was simultaneously being conducted on the general conditions of dwellings and inequities in supply, use, and expenditure of drinking water. The study was conducted on eleven countries of Latin America and the Caribbean: Bolivia, Brazil, Chile, Colombia, Ecuador, El Salvador, Jamaica, Nicaragua, Panama, Paraguay, and Peru.

For the implementation of the study only countries that had data requested between the years 1995 and 1999 were considered. Table 4 provides these countries with the respective types of surveys. Living Standards Measurements Surveys (LSMS) were not the only surveys used, but those used were sufficiently similar, so that the results were comparable. In Brazil, the annual surveys (PNAD) do not include household expenditures, only information on income.

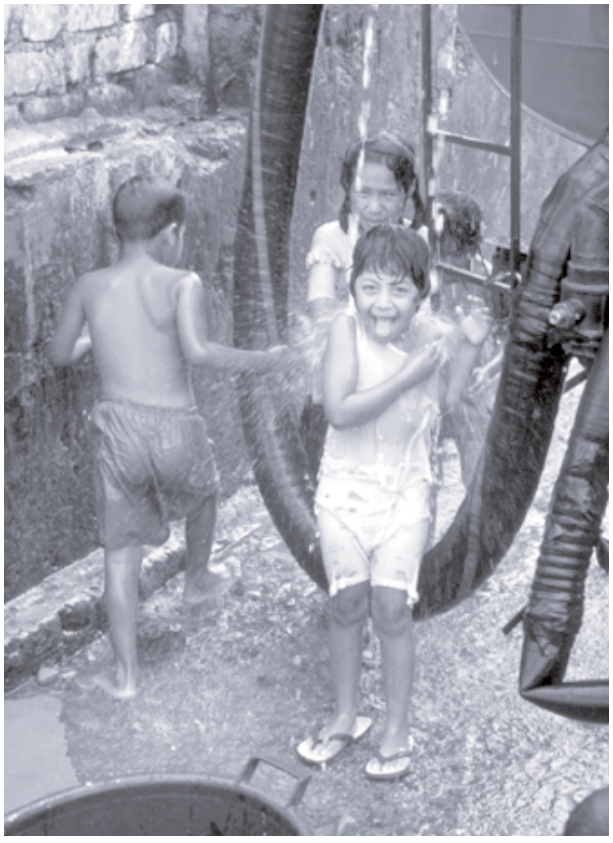
TABLE 4
Countries, Type, and Year of Surveys in Latin America and the Caribbean, with Information on Household, Supply, Use and Expenditure of Water in the Residence

Country	Type of Survey	Year
Bolivia	Continuous Household Survey	1999
Brazil*	Survey on Lifestyles	1996-1997
Chile	Survey of National Socioeconomic Characterization	1998
Colombia	National Survey of Quality of Life	1997
Ecuador	Living Condition Survey	1998
El Salvador	Survey of Multiple Purpose Households	1998
Jamaica	Jamaican Survey of Living Conditions	1998
Nicaragua	Household Survey on Measurements of Standard of Living	1998
Panama	Survey of Standards of Living	1997
Paraguay	Integrated Household Survey	1997-1998
Peru	National Survey of Standards of Living	1997

(*) Covers two regions of the country–Northeast and Southeast.

The study pointed out the following general considerations:

- Inequities in access to and use of drinking water services for families are related to inequities at the levels of expenditure/income of the same. In the various countries that were analyzed access and use of drinking water services with household connection increased to the extent that there are population groups with higher levels of expenditure/per capita income.
- Differences in access to drinking water are not due exclusively to differences in family income or expenditures. In all the countries that were analyzed it was found that in the rural areas a small portion of people had access to water supply by household connection, even though the comparison is made for groups of similar income levels and homes. These differences could partly be explained because of the low population density of the rural areas that make it impossible to meet the specific fixed costs of the investment in public networks systems, or the capacity of these areas in capturing the attention of the authorities and public investment funds.



- Differences in access to and use of drinking water services between urban and rural areas are such that not even high- income families' in rural homes with household connections reach that of the poorer families in urban areas.
- Inequity in access to drinking water through household connection is not always greater in those areas where inequity in the distribution of income is also greater. In some countries access to household connection services in urban areas can be quite homogeneous among the different homes even though in terms of distribution of income there is great inequity. On the contrary, it is possible to find situations where there is great inequity in terms of access and not so in terms of income or family expenditure.
- In some countries the rural areas present average levels of access to drinking water with very low household connection and in turn with low indexes of inequities referred to the family income/expenditure. This implies a scenario in which access to water is egalitarianly deficient.
- In the countries where it has been possible to analyze the situation of the systems, with regard to the regularity of the water supply, it was found that continuity is not always greater in areas where families with greater income live. This is associated with the quality of the delivery of the service, with the possible existence of restrictions of the water resource, and the operation and deficient maintenance of the systems.
- Families that do not have drinking water through household connections are usually low-income and have to travel certain distances in order to be supplied. This lack of access by household connection imposes additional costs to the families. In addition, both the time and the distance tend to be greater, and to the extent that the type of drinking water supplied is more deficient.
- With regard to household disinfection of drinking water, two factors should be taken into account. First, household disinfection should always depend on the quality of the service that the home receives, because if it is considered sufficiently good by the users, they will not be given disinfection. Second, disinfecting the water implies costs in which the home should incur, and to the extent that the income is very low, it is possible that it is more difficult to cope with

such costs. It is important to take into account these two factors since in some countries it is possible to find that household disinfection is low in homes of poor families since they cannot afford the costs, or in rich families, because they utilize water of good quality.

- The precise relationship between the incidence of diarrhea in minors and the access and use of the drinking water services is difficult to establish. The reason is that both are related to income or family expenditure. In families where the type of access and use of the services is greater, the incidence of diarrhea in children is less. Whether the reduction in cases of diarrhea can be attributed to higher income or better access to water requires a more precise statistical analysis and that demands the use of variables that are unavailable for the present study. What indeed can be established is that higher income is related to a better access to water and this, to a smaller presence of diarrhea in children.
- In all the countries that were analyzed countries per capita expenditure for drinking water service tends to increase between families with higher levels of total per capita expenditure. In addition, it was discovered that in urban areas the expenditure in water is greater than in rural areas, although families of similar economic situation were compared. This can be related to differences in the rates paid, which in turn can reflect differences in the types of access between areas.
- When analyzing expenditure with regard to drinking water service by type of supply, it was discovered that some low-income families, because of the lack of household connection would spend a similar amount as those families in better economic situation to be supplied with drinking water. This is the case, for example, of those who purchase truck water.
- In all the countries studied it was found that the proportion of the total expenditure that the families allocate to the use and consumption of drinking water, diminishes in families with greater levels of income or expenditures. This occurs in both urban and rural areas, but more frequently in urban areas. The implication of this is that proportionately to its income the poor end up spending more on water.

To the extent that it can be achieved, greater comprehension of the equity conditions of the population of Latin America and the Caribbean with regard to access and use of drinking water services can be identified and prioritized in accordance with the needs of the neediest groups. Without a doubt, equity is a complex subject that does not have immediate solutions. However, to achieve the goal of universalization of drinking water services it is necessary to examine possible strategies related to the national proposal for the services. It is also important to analyze how national and international agencies for technical cooperation and financing could support or promote investments in that aspect, as well as promote sectoral policies of financing, expansion, improvement of infrastructure and operation of services.

Part III

3.1 INTRODUCTION

The information obtained in the Evaluation 2000 has permitted an extensive view of the situation of drinking water supply and sanitation services in the countries of the Region. It has made it possible to identify the principal sectoral problems, and made available a collection of information that will be of great value to ascertain the current situation, analyze trends, make projections, and establish priorities.

ANALYSIS OF THE REGIONAL SITUATION

It is important to take into account that the Evaluation 2000 included, for the first time, the United States, Canada, and the French and Dutch Caribbean. This means, that in including these countries, comparisons are a little difficult, for purposes of progress or setbacks, with respect to the regional situation of the previous evaluations, since they did not have the information corresponding to these countries.

Table 5 provides a summary of urban, rural and total population of each of the six aforementioned groups. In this table a summary of the population of Latin America and the Caribbean is also presented.

TABLE 5
Estimated Population of the Region of the Americas for 1998, by Groups of Countries
(Population in thousands)

	Summary by Groups					
	Urban Population	Urban %	Rural Population	Rural %	Total Population	% Region
GI Total	209,552	71.59	81,805	28.41	292,704	37.05
GII Total	197,232	76.57	60,355	23.43	257,587	32.60
GIII Total	76,983	72.08	29,814	27.92	106,797	13.52
GIV Total	51,029	84.88	9,090	15.12	60,119	7.61
GV Total	35,345	54.19	29,883	45.81	65,228	8.26
GVI Total	5,308	69.79	2,298	30.21	7,606	0.96
Total Region	**575,447**	**72.84**	**214,592**	**27.16**	**790,039**	**100.00**
Total LAC	**365,896**	**73.57**	**131,439**	**26.43**	**497,335**	**100.00**

Figures 6 and 7 show the percentage of population corresponding to each group of countries, in the `Region of the Americas`, and in Latin America and the Caribbean, respectively.

FIGURE 6. Region of the Americas:
Population of the Analyzed Groups

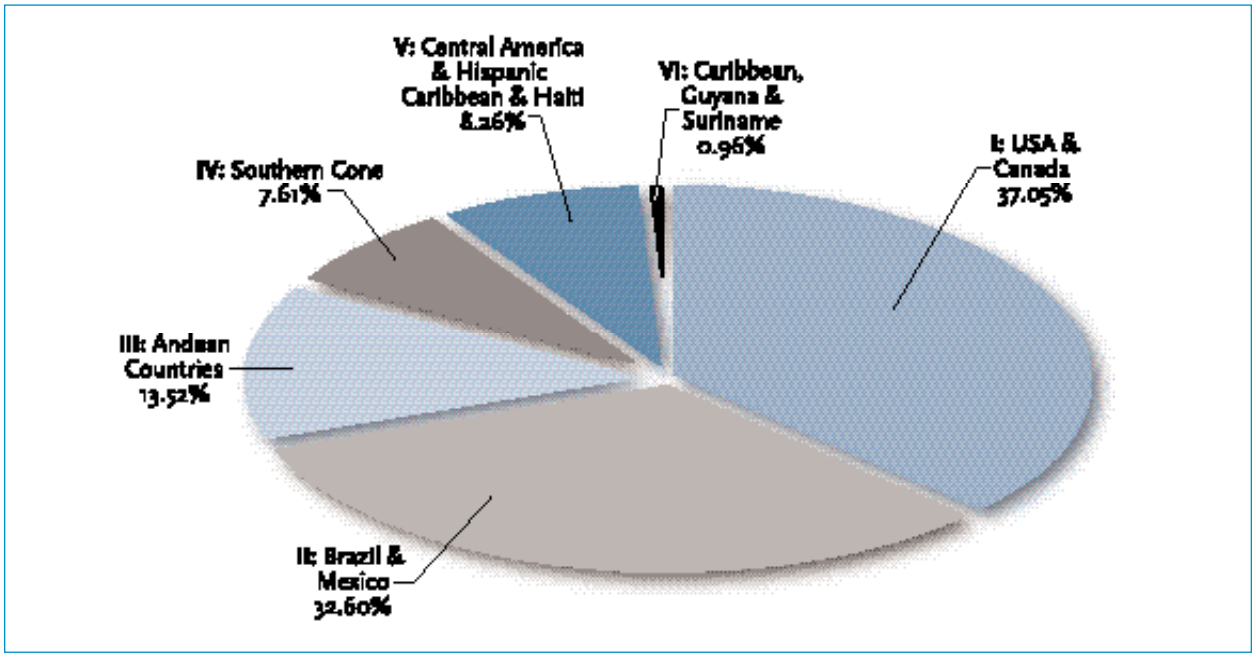


FIGURE 7. Latin America and the Caribbean:
Population of the Analyzed Groups

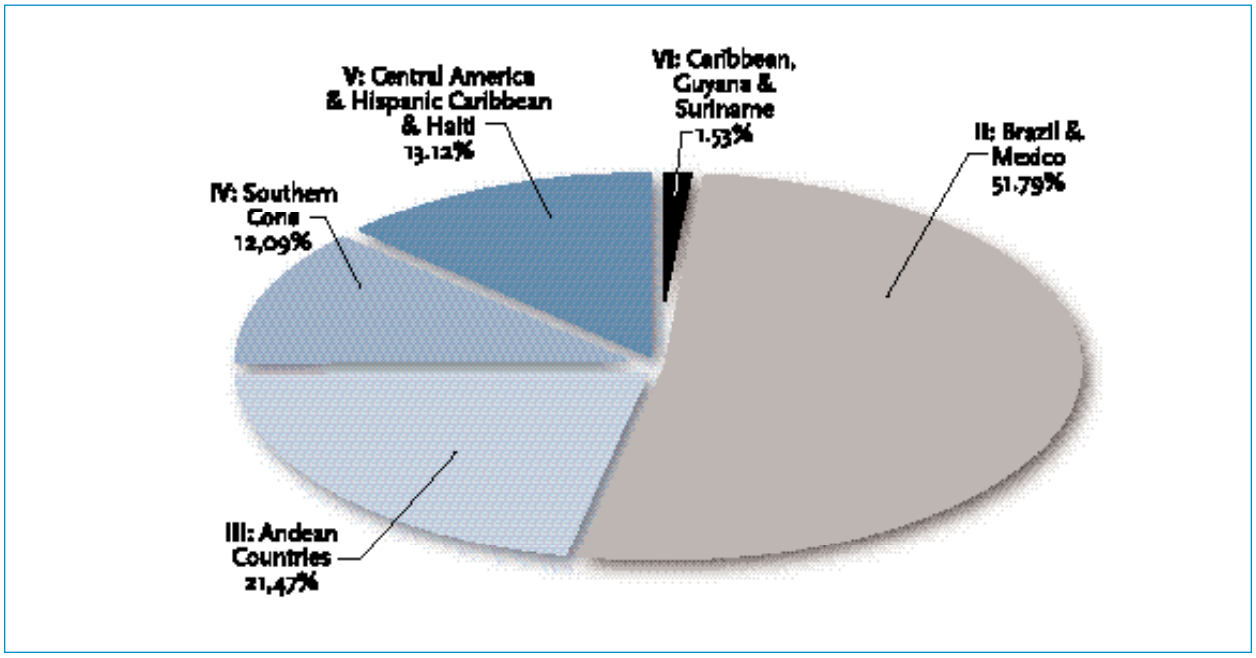
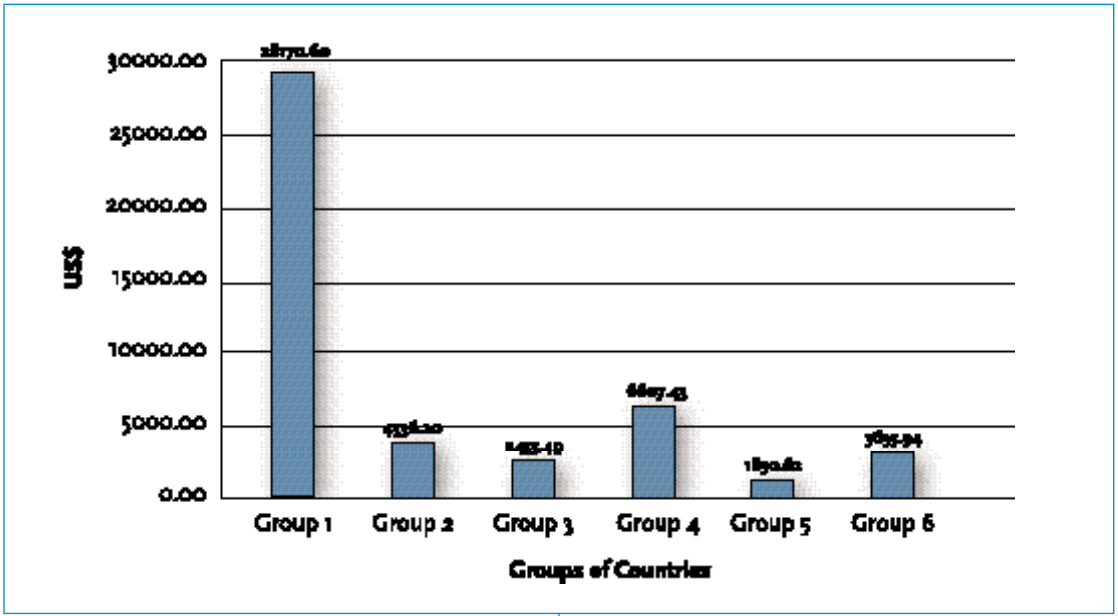


Table 6 and Figure 8 show the average distribution of the Gross National Product (GNP) of the population in the Groups of Countries in 1998.

TABLE 6
Average Gross National Product (GNP) by Groups of Countries, 1998

Group of Countries	Population	Average per cápita (US$)	% of the total GNP of the Americas
Group I	292,704	28,170.60	81.06
Group II	257,587	4,336.20	11.15
Group III	106,797	2,455.49	2.62
Group IV	60,119	6,607.43	3.96
Group V	65,228	1,830.62	0.98
Group VI	7,606	3,635.94	0.23

FIGURE 8
Average per capita GNP by Groups, 1998



Annex I shows the results of the Evaluation 2000 on drinking water supply and urban and rural sanitation for each of the six groups into which the Region of the Americas has been divided.

3.2 HUMAN DEVELOPMENT

It has been recognized for a long time that there is a correlation between quality and coverage of drinking water supply and sanitation services and quality of life and health. Experience indicates that illnesses, waterborne diseases and epidemics tend to disappear under sanitary conditions, where in addition to high coverage in services, there is guaranteed quality of drinking water supply services, and the collection, treatment and sanitary disposal of wastewater and excreta.

In the United States and Canada the Human Development Indexes (HDI) of the UNDP are extremely favorable: 0.96 in Canada and 0.93 in the USA, which places these countries second and third in the

world, respectively, after Norway. Life expectancy at birth is (79.2 years in Canada and 77.0 years in the USA), making the health situation of these two countries the best of the Region. Likewise, morbidity and mortality are typical of developed countries, manifested by chronic diseases, such as cancer and cardiovascular diseases, among others.

The HDI[1] for Brazil and Mexico (0.80 for Brazil and 0.86 for Mexico) are high levels in Latin America. Life expectancy at birth is 67.2 years in Brazil and of 72.5 years in Mexico. These countries demonstrate morbidity and mortality rates which are typical of developing countries characterized by acute diarrheal diseases and high infant mortality; however, in some areas, especially in large cities, cardiovascular diseases and cancer have achieved great importance.

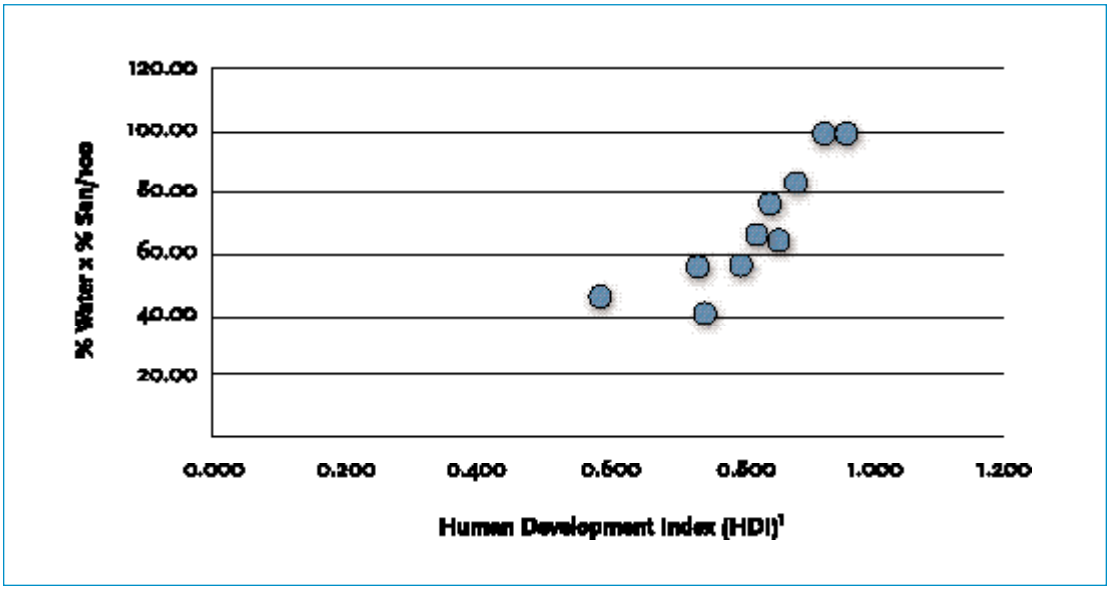
In the Andean countries the HDI are 0.589 in Bolivia, 0.747 in Ecuador, and 0.739 in Peru. Life expectancy at birth is 62.2 years in Bolivia, 71.0 years in Colombia, 69.9 years in Ecuador, 68.9 years in Peru, and 72.8 years in Venezuela.

In the Southern Cone countries the HDI is 0.827 in Argentina, 0.847 in Chile, and 0.883 in Uruguay. Life expectancy at birth is 70.1 years in Argentina; 75.2 years in Chile; 70.0 years in Paraguay, and 72.8 years in Uruguay.

Life expectancy at birth is 75.1 years in Belize; 75.6 in Costa Rica; 74.4 in Cuba; 69.6 in El Salvador; 64.6 in Guatemala; 69.8 in Honduras; 68.5 in Nicaragua; 74.0 in Panama; 74.2 in Puerto Rico and of 69.5 in the Dominican Republic.

The Evaluation 2000 shows the correlation between coverage and the Human Development Index, in the Region. See Figure 9.

FIGURE 9
HDI Correlation versus Drinking Water and Sanitation Coverage in 10 countries of the Region *



* Argentina, Bolivia, Brazil, Canada, Chile, Ecuador, USA, Mexico, Peru, and Ururguay.
The ten countries represent a sample of 82% of the population of the Region of the Americas: Population 645 million

1 The Human Development Index (HDI) consists of three components that define human development: longevity (life expectancy), level of education (level of literacy in adults and average years of schooling), and standard of living (GDP adjusted at the local cost of living). The HDI facilitates the determination of priorities for the intervention of policy and the evaluation of progress over time. In addition, it permits the comparison of experiences among the different countries. Each indicator that integrates the three components is compared with a maximum and minimum value established for that indicator, which results in a set of indexes between 0 and 1.

3.3 COVERAGE OF DRINKING WATER AND SANITATION SERVICES BY GROUPS OF COUNTRIES

The data presented in the Evaluation 2000 corresponds to the decade 1991-2000, and are referenced to the year 1998, the data presented for the Evaluation 1990, correspond to the International Decade of Drinking Water Supply and Sanitation 1981-1990, and are referenced to the year 1988.

GROUP I:
Canada and the United States of America

The criterion utilized for the two countries in this group is based mainly on their high level of economic development. Consequently, there is practically universal coverage for drinking water and sanitation services.

This group, consisting of the two most developed countries, constitutes 37.05% of the population of the Americas, with 292,704 million people. Reports on the last decade have indicated drinking water supply coverage in these two countries at 100%.

Sanitation coverage is 100% in urban areas, with 94.92% of households connected to conventional sewerage systems and 5.08% served by *in situ* systems. In rural areas sanitation coverage is 99.94%, with 31.17% by sewerage, and 68.77% with *in situ* disposal.

In these countries 97.88% of sewerage effluents receive treatment.

It should be noted that in these countries, statistics on coverage in water and sanitation also take into account, statistics on housing, since legislation and regulation do not permit housing without these basic services. There is also concern over the need to establish solutions to the problem of homelessness and numerous public and private institutions collaborate in this field.

The policy of total coverage is temporarily affected by natural disasters (hurricanes, floods, droughts,

tornadoes, earthquakes, etc.). However, an insurance system and federal resources give support in solving these problems. There also tend to be service interruptions due to faulty old pipes, or by work being done to renew the infrastructure.

In general, the drinking water and sanitation sector in these countries is very strong and is characterized by very strict regulations and decentralization of the services at the community and municipal levels. Local attention to drinking water and sanitation problems is facilitated because the financial system, private consulting institutions, and contractors are very developed. All of the above has its basic support in the capacity and will of the population to pay for the services.

However, these countries face new problems caused by the increase in environmental pollution, and the need to make major investments to replace infrastructure that has surpassed its shelf life or is obsolete. The growing demand for standards and for regulation geared towards the protection of the environment and health in these countries makes it necessary to continually improve treatment systems for drinking water, so as to purify the effluents originating from domestic, agricultural and industrial sources.

GROUP II: Brazil and Mexico

The countries in this group, although different, are based on their respective size and population.

This group, which represents the two countries with the largest population in Latin America (257,586 million), constitutes 32.60% of the population of the Americas and 51.79% of the population of Latin America.

Total drinking water coverage achieved by both countries is 88.09%, with 95.23% in urban areas, constituting the highest coverage of the Region after that of Group I. In rural areas coverage is 64.79%, with 37.39% of the population served by household connection, and 27.40% with easy access systems.

It is obvious that these two countries should give greater attention to rural water supply. In the Evaluation 2000, Brazil did not provide information on coverage of disinfection of drinking water. However, the Analytical Report for both countries indicate that in urban areas a policy of universal chlorination is being applied, and although it has had its difficulties in the past, it has been strengthened after the cholera epidemic of 1991. This policy also involves increasing water disinfection in rural areas.

For the two countries sanitation coverage is 80.23%. In urban areas coverage is 91.27%, with 64.63% served by sewerage systems and a 26.63% by *in situ* disposal. In the rural areas coverage is 44.18%, with 8.73% by sewerage, and 35.44% by *in situ* disposal.

It is estimated that only 12.57% of sewerage effluents receive some degree of treatment.

Coverage in water supply and sanitation in Brazil and Mexico have evolved during the last decade in the following manner:

	Drinking Water	With Sanitation
Brazil		
EV 1990	96%	78%
EV 2000	89%	85%
Mexico		
EV 1990	69%	45%
EV 2000	87%	72%

When the figures of the Evaluation 2000 are compared with those of the previous decade, the difference in drinking water coverage observed in Brazil, is probably due to an overestimation of the population supplied with household connections and with easy access systems during the evaluation of the 1980s.

GROUP III: Andean Countries

This group which includes Bolivia, Colombia, Ecuador, Peru, and Venezuela with a total population of 106,797 million, constitutes 13.52% of the population of the Americas and 21.47% of the population of Latin America.

The total coverage of drinking water, achieved by the countries of group III is 82.00%, with coverage in urban areas at 90.30% coverage, and 60.57% in rural areas, with 71.09% of the total population being served through household connections, and 10.91% through

easy access. Considering the low coverage observed in rural areas, 38.69% by household connection, and 21.88% by easy access systems these countries should give greater attention to rural drinking water supply. It is noteworthy that individually, water coverage in these countries is very near the average for the group.

A promotional policy for the disinfection of drinking water distributed is being applied in urban areas, and has achieved coverage of 98% in Venezuela, 84% in Colombia, and 80% in Peru. The latter country has intensified its use of disinfection after the cholera epidemic of 1991, which started along the Peruvian coast. Ecuador has achieved 60% coverage in urban areas and Bolivia 26%. In view of these results, and regardless of the challenges encountered with disinfection in rural areas, it is still necessary to make an additional effort to intensify disinfection of drinking water distributed in urban areas, especially in Bolivia where low coverage encompasses a major risk to human health.

The total coverage in sanitation for the group is 73.85%. Urban coverage is 85.44%, with 68.26% by sewerage and 17.19% by *in situ* disposal. Rural sanitation coverage is 43.93%, corresponding 15.34% from sewerage, and 28.59% from *in situ* disposal. Only 11.54% of sewerage effluents receive some degree of treatment.

Coverage in water supply and sanitation in the Andean Countries has evolved during the last decade in the following ways:

	Drinking Water	With Sanitation
Bolivia		
EV 1990	46%	34%
EV 2000	73%	63%
Colombia		
EV 1990	88%	65%
EV 2000	91%	83%
Ecuador		
EV 1990	58%	56%
EV 2000	70%	58%
Peru		
EV 1990	58%	42%
EV 2000	75%	74%
Venezuela		
EV 1990	89%	92%
EV 2000	84%	69%

When the figures of the Evaluation 2000 are compared with the previous decade, the difference in coverage that is observed for Venezuela is due to an overestimate of the population supplied with drinking water through "easy access" systems and the population served with *in situ* sanitation systems. The sectoral analysis developed in 1998 by HIDROVEN, with the support of PAHO validates the data of the Evaluation 2000.

During the decade of the nineties coverage of these services were strengthened in Bolivia, Ecuador, and Peru. In Peru, the Government provided a great deal of support for the sector, within actions taken to combat the cholera epidemic that started in this country in 1991. Due to the high coverage many of the resources previously devoted to expand services have been devoted to rehabilitation and maintenance of the existing infrastructure.

GROUP IV:
Countries of the Southern Cone

This group, which includes Argentina, Chile, Paraguay, and Uruguay, has a population of 60,119 million inhabitants, constituting 7.61% of the population of the Americas and 12.09% of the population of Latin America and the Caribbean.

The total coverage of drinking water achieved by the group is 80.32%, with 88.23% in urban areas, corresponding to 78.85% being served through house connections and 9.38% by easy access systems. In the rural environment drinking water coverage is 35.88%, with 28.19% of the population served by household connections, and 7.69% with easy access.

In the urban areas a universal chlorination policy is being applied, and the disinfection of urban water is close to 100%.

Considering the low coverage in water supply in the rural environment, these countries should give greater attention to this aspect, especially Paraguay where the percentage of the rural population is significantly high (45.81%). In addition, the countries in this group are involved in increasing disinfection of water in rural areas.

The total coverage of sanitation of the group is 85.33%. In the urban areas coverage is 89.89%, corresponding to 60.78% by sewerage, and 29.11% by *in situ* systems. In the rural areas sanitation coverage is 59.70%, corresponding to 1.75% by sewerage, and 57.95% by *in situ* disposal.

Only 16.54% of sewerage effluents receive some degree of treatment.

Coverage in water supply and sanitation in the countries of the Southern Cone has evolved during the last decade in the following way:

	Drinking Water	With Sanitation
Argentina		
EV 1990	64%	89%
EV 2000	79%	84%
Chile		
EV 1990	86%	83%
EV 2000	94%	93%
Paraguay		
EV 1990	33%	58%
EV 2000	44%	67%
Uruguay		
EV 1990	85%	60%
EV 2000	98%	94%

During the decade of the nineties it was possible to strengthen coverage in water supply in the four countries of the Southern Cone. Except for Argentina, which already had high coverage in water supply. The rest of the countries of this group also increased coverage in sanitation. It is assumed that the decrease in sanitation coverage in Argentina probably resulted from an overestimation of the 1990 evaluation.

GROUP V: Countries of Central America, Hispanic Caribbean, and Haiti

This group, comprising Belize, Costa Rica, Cuba, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Panama, Puerto Rico, and the Dominican Republic, with a population of 65,228 million inhabitants, constitutes 8.26% of the population of the Region of the Americas and 13.12% of the population of Latin America and the Caribbean.

In drinking water, the total coverage achieved by the group is 78.61%, 93.00% represents coverage of these services in the urban environment, with 79.18% served through house connections and 13.83% with easy access systems.

In many of the urban areas, a policy of universal disinfection of the distributed water is being applied, with 100% coverage in Belize, Costa Rica, Nicaragua, Panama and Puerto Rico. In the Dominican Republic coverage in disinfection of water in the urban environment is 95%, Cuba 91%, Honduras 51%, Guatemala 25% and Haiti 20%. Considering the low coverage in these last three countries, it is essential that additional effort be made to intensify disinfection of drinking water distributed in urban areas in these countries.

In the rural areas coverage of drinking water for the group is 61.59%, with 39.82% of the population served by household connections, and 21.82% by easy access. The countries that form group V should give greater attention to rural water supply.

The total coverage in sanitation of the group is 77.12%. In the urban areas sanitation coverage is 91.19%, corresponding 49.72% to sewerage and 41.46% to *in situ* systems. In the rural environment coverage is 60.49%, corresponding 4.44% to sewerage, and 60.49% to *in situ* disposal.

Only 23.71% of sewerage effluents of Central America and the Hispanic Caribbean receive some degree of treatment, a value that, although low, is the highest of Latin America.

The coverage in water supply and sanitation in the countries of Central America, the Hispanic Caribbean, and Haiti has evolved during the last decade in the following way:

	Drinking Water	With Sanitation
Belize		
EV 1990	77%	73%
EV 2000	91%	48%
Costa Rica		
EV 1990	94%	97%
EV 2000	95%	94%
Dominican Republican		
EV 1990	52%	60%
EV 2000	88%	90%
El Salvador		
EV 1990	41%	61%
EV 2000	59%	68%
Guatemala		
EV 1990	60%	57%
EV 2000	80%	79%
Haiti		
EV 1990	42%	22%
EV 2000	46%	26%
Honduras		
EV 1990	72%	62%
EV 2000	81%	70%
Nicaragua		
EV 1990	53%	19%
EV 2000	67%	76%
Panama		
EV 1990	83%	84%
EV 2000	87%	93%

The difference in sanitation coverage in Belize is due to an overestimation of *in situ* systems in the urban and rural environment, in addition they adopted more rigorous criteria for sanitary systems. In Costa Rica the criteria for classification of *in situ* systems are stricter in the Evaluation 2000.

During the decade of the nineties it was possible to strengthen coverage in water supply in all the countries of Central America and the Hispanic Caribbean. There was also increased coverage in sanitation in Nicaragua (76%). However, Haiti remained stagnant with low coverage in water and sanitation.

As previously mentioned, when coverage reaches high levels, resources are oriented toward rehabilitation and maintenance of the existing infrastructure. In Costa Rica and Belize the reduction observed in sanitation could also be related to late attention given to sanitation coverage in settlements of immigrant populations from neighboring countries. In both countries efforts to face these problems have been made. The enormous increase in sanitation coverage observed in Nicaragua is attributed to the fact that in the evaluation of the 1980s *in situ* systems were not recorded, which reflected the low total coverage. Drinking water and sanitation coverage in the Dominican Republic has had a notable increase during the 1990s, mainly due to major investments in the sector during that period.

GROUP VI: Countries of the Dutch, English, and French Speaking Caribbean, Guyana and Suriname

This group, comprising 24 countries or territories, has a population of 7,606 million inhabitants, constituting 0.96% of the population of the Americas and 1.53% of the Region of Latin America and the Caribbean. The group is diverse and includes very large distances that go from Bermuda up to Guyana and Suriname. Two of the most populated countries of the group, Jamaica, and Trinidad and Tobago with a total of 3,824 million inhabitants comprise 50.28% of the population of the group. The other countries, 22 in total, with 3,782 million inhabitants are small in size, and therefore in a majority of them there is no clear separation between urban and rural environment.

The coverage in water achieved by the majority of the countries with small populations is very high, close to 100% in the majority of them, but in Jamaica and Trinidad and Tobago the coverage is 80.52% and 85.99% respectively. In the majority of the countries of the group special attention has been given to the disinfection of water distributed, which has resulted in coverage very close to 100% in most of them.

The total coverage of sanitation of the group is 90.26%. In urban areas coverage is 92.31% and 85.93% in rural areas. In Jamaica and Trinidad and Tobago, coverage is 90.45% and 99.60%, respectively. Some countries with limited territory are abusing *in situ* disposal of wastewater, which in the future can create problems with the quality of the groundwater (nitrogen and phosphorus compounds).

Below is an analysis of the evolution of the coverage in water supply and sanitation in the countries of the Dutch, English, and French Speaking Caribbean, Guyana and Suriname during the last decade, which was provided from information for the "Evaluation of the IDWSSD in Latin America and the Caribbean. 1980-1990:

	Drinking Water	With Sanitation
Bahamas		
EV 1990	100%	56%
EV 2000	96%	100%
Barbados		
EV 1990	100%	17%
EV 2000	100%	99%
Guyana		
EV 1990	81%	86%
EV 2000	93%	85%
Suriname		
EV 1990	72%	56%
EV 2000	86%	86%
Trinidad and Tobago		
EV 1990	96%	99%
EV 2000	86%	100%

In these countries there was difficulty in maintaining the high coverage reached during the decade of the nineties. In the countries with less coverage some progress was seen in the Evaluation 2000. Increase in coverage in sanitation in Bahamas, Barbados, and Suriname was due exclusively to the increase in *in situ* systems, which predominate these countries, corresponding 84% for Bahamas, 87% for Barbados and 99% for Suriname.

3.4 COVERAGE AND QUALITY OF THE SERVICES IN PERI-URBAN AND RURAL AREAS

The Evaluation 2000 clearly demonstrated that in spite of the advances observed in Latin America and the Caribbean there is still a strong contrast between coverage and quality of service in water supply and sanitation, among urban and rural areas. In addition, in some of the countries with high urban coverage, as is the case of Argentina and Brazil, the levels of coverage in rural areas are quite low. This implies that they should continue to give special attention to rural areas, and reform the support mechanisms for the rural population.

The peri-urban areas also deserve special treatment, since they frequently present complex water supply and sanitation problems. Some countries have introduced innovative approaches to solve the water supply and sanitation problems in peri-urban areas. Those experiences should be evaluated, documented and its results widely disseminated. The available information indicates that in many of the countries of the Region there is still a part of the population that do not have the minimum conditions to meet the basic needs for water supply and sanitation, that is, availability and easy access to water of good quality. This should be at least 20 liters per person per day, and to an installation adequate for the sanitary disposal of excreta.

These inequities need to be corrected through changes in attitude, procedures, and priorities, complemented with effective social mobilization and community participation.

3.5 CONTROL AND SURVEILLANCE OF WATER QUALITY

With regard to the quality of distributed water, the United States and Canada have the best control in the Region. Even though these two countries are leaders in quality control of drinking water in the Region, there is concern over the population that can be exposed to chemical, toxic, or biological pollutants.

In the United States there is concern about the possibility of the presence of polluting substances in drinking water which previously were not considered in drinking water quality standards, among them, some organic compounds, including synthetics, and disinfection by-products. The Environmental Protection Agency of the United States (USEPA) has a strategic plan (Strategic Plan Goal No. 2 "Clean Safe Water"). This plan foresees that by the year 2005 approximately 95% of the population served by community water systems will receive water that meets the Drinking Water Standards for

the country (in 1994 the goal was 84%). By the year 2005, the Agency plans to incorporate ten new high-risk pollutants into its water quality control programs, among them, disinfection by-products, arsenic and radon.

Because of its importance to public health, water quality deserves special care. Despite advances in recent years, in Latin America and the Caribbean water quality problems still exist in the majority of the countries. In general, this is a result of deficiencies in the operation and maintenance of the services. Systems that function intermittently, inefficient treatment plants, absence of, or problems with disinfection, distribution networks in precarious conditions, clandestine households and poorly made connections, and problems with household installations are some of the principal factors that contribute to poor water quality. Other facts include institutional arrangements, and inadequate and insufficient resources and mechanisms for control and surveillance.

Since the cholera epidemic in Latin America in 1991, there has been significant progress in the disinfection of drinking water in urban areas, with a regional goal of achieving 100% disinfection. Although there is interest in disinfection of rural water supply systems, the progress has been slow due to difficulties in delivering the disinfectants to remote places. However, the problem is being resolved in some areas by utilizing disinfectant solutions generated "on site" by electrolysis of common salt (sodium chloride).

Several countries of Latin America and the Caribbean have prepared national plans for the control and surveillance of drinking water quality, an activity which has the support of several international cooperation agencies that participated in the implementation of the Declaration of Santa Cruz de la Sierra. This Declaration, made at the end of the 20th Century, at a regional conference, (Summit of the Americas), expresses a consensus that serves well as an inspiration and a guide for the new millen-

nium. It clearly expresses the fundamentals of water quality: universal service, innocuousness, and continuous protection of the water resource within the concept of multiple barriers.

3.6 INTRA AND EXTRA-SECTORAL COORDINATION AT THE COUNTRY LEVEL

The location of the drinking water supply and sanitation sector within the structure of the State varies from one country to another. Actually, in a majority of the countries these services do not constitute a sector by itself. They tend to be located as a sub-sector within the health sector (some countries of Central America), directly in the Ministry of the Presidency (Peru), public services, public works, environment and natural resources sector (Mexico), or in the environment sector (USEPA, the United States), among others.

The reason for this diversity in the location of the sector has its origin in the fact that water is an essential natural resource and of multiple uses. The recognition of the importance of water resources has led many countries to create national, state or departmental committees of water resources, and watershed authorities, among others. For this reason, the ministries of planning are almost always linked to the management of water resources and the provision of drinking water and sanitation services.

Regardless of where they are located organizationally the drinking water supply and sanitation sector should always be coordinated at the national level. In general, the ministries of health are always involved in water-related health issues, even in the event that the services have been assigned to another sector. The same happens with regard to the environment sector, since the management of natural resources is inseparable from water resources.

Due to its nature, these services will always be regulated by the State, with the understanding that new trends toward privatization are temporary concessions to private companies under state control and supervision.

Some countries of Latin America have attempted to strengthen national institutions related to water supply and sanitation services. This is the case of Brazil, which in the 1980s with support from the "Banco Nacional de la Habitación" (BNH) strengthened National Coordination and State Sanitation Companies, in an effort to increase coverage. Likewise, during the decade of the nineties, Mexico managed to strengthen national coordination and coverage in these services. To this end, it created the National Water Commission, Clean Water Program, and the Mexican Institute of Water Technology (IMTA), having made great strides in disinfection of drinking water and some progress in the treatment of sewerage effluents.

3.7 ORGANIZATION OF THE SECTOR AND DELIVERY OF SERVICES

The basic concepts on sustainable development necessary for the achievement of efficient management and good technical and operational management of drinking water and sanitation services have moved forward in Latin America during the last two decades.

In the Region, there have been different approaches to institutional organization of the delivery of services. In the 1970s and 80s, centralization of the services in national or state/provincial entities facilitated the development and execution of projects oriented to the expansion of the infrastructure and access to the services. However, in the present decade, the Evaluation 2000 reveals that for most of the countries, experience has demonstrated that management, operation, and maintenance of water and sanitation systems are more efficient if managed at the local level. Direct and daily contact between those responsible for the delivery of services and users is very important and can only be achieved with the participation of the local level.

Unlike some countries of Europe and Asia, in the Region of the Americas the ownership of the services is kept in the hands of the State. In the United States and Canada institutional organization of the services, whether public or private is for the most part municipal and is characterized by autonomy in management, that is achieved in the local area, with federal and state support. In Argentina, Brazil, and Chile, although the models for management of the

services are in the reform and modernization phase the formation of state/provincial enterprises, whether public or mixed economy still has special importance. In Central America and the Caribbean the formation of National Institutes of Water Supply and Sanitation constitutes a more customary organization model. In Mexico the creation of the National Water Commission serves in a steering role for the sector providing leadership, policies and direction to the operating agencies at the state, inter-municipal and/or municipal level.

One of the major problems for Drinking Water and Sanitation entities in Latin America has been the institutional inability of the sector to recover costs at an adequate level. This recovery should permit, in addition to covering the operation and maintenance costs, to cope with the financial obligations for the payment of debts and the provision of resources for expansion, maintenance, and rehabilitation of the physical infrastructure of the systems. In Latin America and the Caribbean in a majority of the cases, government subsidy do not directly benefit the population, since it is almost always oriented towards covering expenditures generated by operational and managerial inefficiency.

Popular and political pressure from communities, which is needed to improve drinking water, sewerage and sanitation services, has been disregarded. However, greater knowledge of the negative consequences of inadequate sanitation on public health and the environment have resulted in an increase in the number of groups that raise consciousness on these problems.

The creation of public municipal companies, handled by a more stable, more professional, and less politicized entity than municipal councils have in some countries, constituted a good model of decentralized services.

It is expected that in the future increased participation by civil society and the private sector, particularly in the management of problems associated with drinking water supply and sanitation, will facilitate greater efficiency and quality of the services. It is considered that the development of private consultants both in technical areas of engineering and business development facilitates the management of services at the local level.

The operation and maintenance of water supply, sewerage and sanitation installations have been the responsibility of public entities, either state or municipal. However, in recent years there has been increased participation from private companies.

Efficiency in operation and maintenance distinguishes the developed countries from the developing countries, as is the case in both the United States and Canada.

With few exceptions, Latin America and the Caribbean have had serious problems in efficiently operating and maintaining systems. The result has been poor quality service, with deterioration in the infrastructure.

3.8 INSTITUTIONAL RESPONSIBILITIES

In the countries with universal coverage, and in almost all those that show continuous progress in the extension of coverage, operational sectoral planning considering the national level is minimal, and sectoral planning is always a strategic component for the establishment of policies oriented to urban development. In addition, operational planning of the services at the municipal level is very strict and targets potential market growth and the need for expansion and/or rehabilitation of the infrastructure.

In some other countries of the Region there are units within the National Planning System or national organizations, with responsibility in the sector, that compile information and in some cases establish a National Plan on Drinking Water Supply and Sanitation.

In the countries with large populations the national plans have other characteristics including directives and systems for financing the sector, and in some cases state, departmental or provincial plans. In the countries with smaller populations, especially in Central America and the Caribbean, there are national agencies responsible for the sector that prepare and execute national plans.

Some countries prepare national plans that include only federal support, or support of the central government to communities and municipalities. However, this does not constitute a real national plan, but a plan of support for decentralized or de-concentrated agencies. This is the case of Costa Rica, where the Costa Rican Institute of Water Supply Systems and Sewerage (AyA) have developed a Strategic Plan with a View to the New Millennium. This plan defines strategies and specific policies for AyA, with the goal of achieving self-financing and de-concentration of the functions of the sector.

In other countries there are no general plans for the development of the sector, but there are units that plan projects for improvement and expansion of the services.

When decentralized companies, either community, municipal, or private, provide the service, planning is made independently by the different companies. The majority of these companies have units directly responsible for planning, and contract consulting firms for research.

In almost all the countries of the Region of Latin America and the Caribbean the ministries of health are responsible for establishing the criteria for drinking water quality which is necessary for protecting the health of the population. In some countries there are agencies or ministries of the environment that share this responsibility with the ministries of health. However, surveillance and certification of water quality are often omitted.

Great strides have been made in strengthening the concept of business efficiency for the delivery of water supply and sanitation services, understanding "company" as an entity that has administrative independence and generates its own financial resources through the services that it provides. Considering the growth of the company, there are cases in which state subsidy becomes necessary; this should be the exception and not the rule.

It has been possible to define models and procedures to strengthen institutional development of companies providing these services. The soundness and efficiency of the companies, and the attitude and responsibility of the users in the final analysis, depends on the reliability and quality of the services. What is most important for the achievement of good service at a reasonable price is to have a company that provides solid and efficient service. This has been achieved in several cases in the Region of the Americas, by municipal, state, private, and mixed public enterprises. Today it is believed that allowing greater participation of private enterprise in the delivery of services would improve efficiency. However, due to its nature, these services should be regulated by the State, which should assume its authority, and create regulatory frameworks that oversees the relationship between company/user of the services.

The management, control and protection of water resources are very complex with multisectoral and multidisciplinary characteristics. The ministries of planning fulfill a very important role as multisectoral coordinator, while the ministries of health, agriculture, trade, transportation and tourism, as well as agencies for the development of water resources participate in this process. The entities that provide drinking water and sanitation services work jointly with the aforementioned ministries since they have a vested interest in the conservation and protection of the water resources. This same fact should ensure that they give a great deal of importance to the adequate disposal of wastewater, as a way of having moral authority and setting an example in good management of water resources for others involved.

It is obvious that the municipalities, private sector, and the general public play a very important role in the management of water resources, especially with regard to the costs involved.

3.9 NEW SECTORAL APPROACHES

Practically, all the countries of Latin America recognize the need for reformulation and strengthening of the drinking water and sanitation sector. Some countries, such as Argentina, Chile and more recently Venezuela and the Dominican Republic, have made advances in this regard. The trend toward increase participation by private enterprise implies

major sectoral and institutional changes. A vast majority of countries recognize the need for reviewing legislation, establishing regulatory frameworks that correspond to the sector, setting up regulatory agencies to open up the sector to the participation of private enterprises, and giving a business approach to the supplier entities of these services. Another important point that should be taken into account in sectoral reforms is that greater attention must be given to peri-urban and rural areas.

In the Region, restructuring of the sector is eminent due to its evolution, and based on the need for a change in structural function, which would allow for efficiency and avoid overlapping of functions and duplication of services. Many countries have already adopted this new structure, where regulation, control, and operation functions are separated.

Private participation constitutes an approach that is increasingly being utilized to improve efficiency of services and provide financial resources. This reform promotes the participation of private investments in infrastructure and management of drinking water and sanitation companies, through privatization. Private sector participation helps to reduce the influence of political fluctuations in government on the sector. This participation should be encouraged and supported with corresponding regulation. The form of private participation most utilized in Latin America is the outsourcing and concession of services. Countries like Bolivia will create a Basic Sanitation Authority that will serve as the regulatory entity for the services, which will be concession out, especially in cities with more than 10,000 inhabitants. In addition, Panama will concession the production process, including the construction, operation, and maintenance of the systems, to the Institute of National Water Supply and Sewerage Systems (IDAAN), which in turn will concession the services of the districts of Chorrera, Arraijan and Capira. Argentina utilizes the cooperatives and local associations for the delivery of services in small urban communities and rural localities, respectively, as a way of privately providing water and sanitation services. Thus, the regulatory entities from each jurisdiction perform the regulation and control of these services, and offer logistic and economic support to the organizations.

In Latin America and the Caribbean, modernization of the sanitation sector has been slow, due to major investments in the infrastructure, which is necessary for the collection and treatment of wastewater and non-domestic or industrial effluents.

Decentralization of the services at the municipal level, accompanied by the transfer of economic resources to support programs at the local level, is being initiated in several countries of the Region, such as Mexico, which has the institutional and legal framework to support decentralization.

Community participation is a very important component to the development of the sector, especially in peri-urban and rural areas. In the majority of the countries of Central America and the Caribbean 50% of the population live in rural areas, where community organizations and local communities actively participate, even in the decision-making process, with regard to the supply of the services. For example, in Belize, the Village Council Act, which is being prepared, will give greater autonomy to local communities in this regard. Chile has placed great emphasis on community participation in the operation and maintenance of drinking water systems installed by the State. For instance, beginning in 2000, investments in rural systems which the community assumed, were subsidized to cover differences between the costs of investment and the amount financed by the users in accordance with their ability to pay.

The reform and modernization of the drinking water and sanitation sector has not usually included rural areas of the Region, since greater emphasis has been in urban areas.

In the coming years there will be a great need in the countries for technical and financial cooperation from the international community, in order to plan and execute those activities related to sectoral strengthening and institutional modernization.

3.10 PRIVATE SECTOR PARTICIPATION

At the regional level there is a strong trend towards decreasing the presence of the State in the direct

management of public services and increasing private sector participation.

In Latin America, several countries have advanced with this process and have concession public services, including the operation of water supply and of sanitation services, to private enterprise, as is the case in Argentina, Colombia, Chile and more recently Brazil, among others. It is difficult to foresee the extent, results, and consequences of private sector participation in the management, operation, and maintenance of water supply and sanitation. This implies profound sectoral and institutional changes, new approaches for the delivery of services, important adjustments in costs and prices, as well as in the utilization of human resources and national technological capability. It is expected that, in some cases, this new style will facilitate the financing of the work required for the delivery of services as well as the recovery of costs.

Some countries want to rapidly advance the concession process to private enterprise, without first defining a policy for the sector, form of regulation and constitution of the regulatory and sectoral coordination entities and without institutionalization of the sectoral steering role. Others express concern about the steering role and regulatory capacity of the State in guaranteeing equity and protection of the users in light of this new modality for the delivery of services.

Towards the end of the decade a change of position was observed in some countries with regard to the role of the Government in financing, development, operation, and maintenance of water supply and sanitation projects. There are countries that are reserving a portion of public funds allocated to the sector, to prepare their principal institutions for the modernization process and sectoral reform. The priority, more than to utilize national funds for the development of the infrastructure or national capability, is to prepare the institutions to be viable and accelerate the concession process with private enterprise. There is the risk that upon considering that in the future the most important part of the

sector will be contracted to private enterprise under concession, the decision-making levels will allocate even fewer resources for water supply and sanitation mainly in the rural environment. This would create serious damage for that part of the sector that will not be under concession, which is the most vulnerable segment of the population.

In Canada and the United States there is strong participation by private enterprises in the provision of services. However, the majority of assets of the systems are public property. Traditionally, participation by private enterprise has been in consultancy, and construction. The new form of participation by the private sector is in business management, operational planning of the services, operation, maintenance, billing, and collection.

3.11 HUMAN RESOURCES

Several countries of the Region have the ability to implement human resource development programs for the drinking water and sanitation sector, but in many cases that capacity is not utilized in a regular and timely fashion. There are other countries that still do not have the mechanisms or resources to guarantee the education of the personnel for the sector.

The lack of adequate business management in many of the drinking water and sanitation institutions frequently implies the lack of human resources management policy, which has meant a high turnover of the personnel of the sector. This characterizes the drinking water and sanitation sector as a generator of trained human resources for another sector.

In the Region there is concern over the training of staff in companies responsible for water supply and sanitation services, particularly in areas such as technical engineering, business and institutional development. In a majority of the countries this has led to progress in staff training in the aforementioned areas.

In Chile, the quality and capacity of human resources has contributed to the proficient operation of the sector. The country has an excellent system of academic preparation for professionals and technicians in all aspects of sanitary engineering, through universities, professional and technical training centers, and technological centers that promote research and development. In addition, some professional Chilean associations have contributed to the education and knowledge of human resources of the sector. These includes the Chilean Chapter of AIDIS; the Chilean Chapter of the Latin American Association of Hydrology and Groundwater (ALSHUD); the Chilean Society of Hydraulic Engineering (SOCHID), and the Chilean Association of Health Sector Lawyers. Similarly Mexico, with the Mexican Center of Training in Water and Sanitation (CEMCAS), which belongs to the Mexican Institute of Technology of the Water (IMTA), serves as a system for academic training for personnel in charge of providing drinking water services, sewerage, and wastewater treatment.

In a sizable number of countries of the Region, particularly the countries of the Caribbean, there is a shortage of trained human resources in the sector, both in quality and quantity. Consequently, professionals of other specialties have joined the technical cadres responsible for the design, construction, operation, maintenance and management of the institutions related to the sector. Furthermore, due to political interference, low remuneration, and lack of incentives, trained staff quit the companies providing these services in a short period of time.

Most of the training is obtained through the education system of the countries, including universities, technical schools and industrial training institutions. However, there are water supply and sanitation companies, directly, or through associations or subregional mechanisms, such as, AWWA, WEF, CAPRE, ANDESAPA, WASA, among others, which carry out more specific courses or activities directly related to the activities of drinking water supply and sanitation.

In some countries such as Argentina and Brazil training activities for professionals, technicians, and workers are carried out mainly by non-governmental organizations in the sector. These include AIDIS Argentina, the Federal Council of Health Services Entities (COFES), the National Federation of Sani-

tary Workers (FENTOS) and the Brazilian Association of Sanitary Engineering (ABES). The training covers a broad range of subjects including business, administration, financial economics, legal and environmental aspects that complement the professional academic training at the university level. In addition, graduate courses at the master's and doctorate levels are offered in Engineering with application in Sanitary Engineering.

3.12 SECTORAL INFORMATION

In many countries of Latin America and the Caribbean there is a lack of information and comprehension of the problems and potentials for investment in water supply and sanitation sector. Although a great deal of useful technical information is circulated, little of this information is used to develop the type of information needed to evaluate the sector in all its aspects. As a result, there is a lack of adequate basic information on existing activities on which criteria could be based for an evaluation that can be utilized in the planning of the sector.

In addition, in the countries where there is decentralization of the services it is difficult to obtain statistical information on the situation of the sector.

Few countries of the Region have appropriate information systems and statistics on the sector that is updated periodically. The information from the sector needs to be organized in order to facilitate better knowledge of the same, so that it has a positive impact on the entire population.

The database set up by the Evaluation 2000 in CEPIS provides an organized regional system with the information collected from the countries on the sector.

3.13 COSTS OF THE SERVICES

The data obtained in the Evaluation 2000 revealed that costs are variable from country to country, within different areas of a single country, and in accordance with the type of service, either household connection, easy access, sewerage, or *in situ* disposal. With the exception of Group I, difficulty in achieving recovery costs is one of the greatest obstacles that countries face. This deficiency is related to the inefficient operation and management of drinking water and sanitation services, poverty, lack of education, and knowledge of the impact of these services on the quality of life and health.

As a result of the Evaluation 2000 the analysis on investments makes it possible to estimate that the average cost of the infrastructure, implying shelf life of 20 years, is close to US$1,000 for Canada, and US$400 for Latin America and the Caribbean. The database of the Evaluation 2000 generated in CEPIS and accessible on its Web page provides infrastructure costs submitted by the different countries of the Region.

The operation and maintenance costs are more difficult to estimate due mainly to distortions generated by governmental subsidies for the operation of the institutions of the sector, including capital investments, payment of wages, managerial inefficiency, and technical deficiencies. In the Region, many institutions of the sector do not know the real costs of drinking water and sanitation services.

According to the Evaluation 2000, the investments required by both services range from more than US$1,500 per inhabitant served in developed countries, to intermediate values for rehabilitation of existing systems or construction of new using appropriate technologies. In developing countries values range from less than US$100 per inhabitant with easy access to water, but without household connection and *in situ* sanitation.

The variation in operation and maintenance costs is very high among the different countries, and even within the same country. The same situation occurs with regard to rates. The Evaluation 2000 database shows the operation and maintenance costs and rates provided by the different countries of the Region.

3.14 TARIFFS

The average tariff of the drinking water and sanitation services in the Region of the Americas are varied. The values range from close to US$30 per

month by unit of consumption or service in urban areas of the developed countries, to less than US$1 per month by housing unit in poor areas of developing countries.

In almost universal fashion, in the countries of the Region, except for the countries of Group I and some other countries, tariffs do not succeed in covering operation and maintenance costs, which is the reason why the services are subsidized.

State subsidies have created a growing dependency on institutions providing drinking water and sanitation services in a large number of countries of the Region. For example, in the Dominican Republic in the absence of incentives, subsidies have contributed to the commercial and financing autonomy of the companies. In this country, approximately 98% of the State subsidy is oriented to new works and a minimum quantity is destined to ensure the operating expenses of the existing services, which affects existing installations resulting in rapid deterioration of the production infrastructure. Similarly, in Venezuela the companies operating the services receive subsidies from the national government or regional governments, either to cover operational deficits or investments, characterizes of being directed to the supply rather than demand. A sizable number of the current rates in the Region have implicit subsidies, as is the case of Uruguay, where commercial and industrial consumers subsidize domestic consumption and Montevideo users subsidize the rest of the country.

However, for most of the countries of the Region there is a growing trend to demand greater efficiency from the entities providing the services and to promote private participation in management, operation and maintenance, and investment of services in urban areas. The rural areas are still subject to governmental subsidies, although there is a trend to promote public participation in the operation and maintenance of the systems.

3.15 INVESTMENTS

The investments required in drinking water supply and sanitation services are large. The Regional Plan for Investment in the Environment and Health (PIAS) evaluated that Latin America and the Caribbean (in 1990 dollars) will require US$114,830 million for the period 1993-2004, including US$7,620 million for solid waste management. The foregoing amounts to an average annual investment US$7,133 million (1992 dollars), that transferred to dollars for the year 2000 represents approximately an average annual investment of US$10,000 million.

The American Water Works Association (AWWA) evaluated (in 2000 dollars) US$325,000 million as the necessary investments in water infrastructure for the next 20 years in the United States of America. The Water Environment Federation (WEF) evaluated in US$330,000 million as the necessary investments in sewerage and sanitation for the next 20 years in the United States of America. The foregoing gives an average annual investment of approximately $33,000 million.

In addition, Canada considers that there is a need to make an investment of US$3,000 million annually in the period 1997-2012 for the sector.

In short, the required average annual investment in the 'Region of the Americas' in water supply and sanitation in the period 2000-2010 is approximately US$46,000 million.

The average annual per capita investment that the United States and Canada should make is approximately US$125. The average annual investment per capita that Latin America and the Caribbean should make is approximately US$21. The low per capita investment expected in Latin America and the Caribbean is due to lower unitary costs and to the use of less stringent standards and simpler technologies. The previous are average per capita annual investments, and have been obtained by dividing the annual investment foreseen between all the population. These figures should not be confused with the per capita costs of infrastructure, which are much greater.

The investments that the United States and Canada have to make in order to maintain its total coverage is almost six times greater than the one that Latin America and the Caribbean should make in order

to arrive at the same. However, taking into account the level of development and per capita income (greater relation from 10 to 1), the required effort in Latin America and the Caribbean is greater.

In the majority of the countries of Latin America and the Caribbean, the investments destined for sewerage and sanitation are still very low, in relation to the investments destined to drinking water supply, and have not changed significantly when they are compared with the previous decade. The investments for water supply in the rural areas have increased in some countries, like Costa Rica, where in the period 1980-1990, 84% of the investments were destined to the urban areas and only 16% to the rural areas. During the period 1991-1998, 54% of the investment was destined to the urban areas and 46% to rural areas in an effort to level the conditions of the rural areas to the urban areas.

Traditionally, financing of investments for drinking water and sanitation services has been made through direct contributions of the State. This was done through tax revenues or loans with the endorsement of state, with agencies or national banks of social development, and with external financial cooperation agencies (bilateral or multilateral). In the case of loans, which is reflected in the various evaluations made since the 1960s, the sector in most of the countries, does not generate sufficient resources for the payment of the debt and capital costs.

For a long time it was thought that with the initial support of the State, entities providing these services would become autonomous. However, experience indicates that growth in coverage, administrative and managerial inefficiency, politicization of the entities providing the service, and the low will or inability of the population to pay, has resulted in the State allocating additional resources to support the operation, maintenance and rehabilitation of the systems. In light of growing deterioration of the infrastructure and quality of the services, the data

obtained in the Evaluation 2000 revealed that the countries of the Region are generally insisting on organized community participation and private enterprise in the delivery of these services.
The lack of investment from the principal public entities of the sector constitutes an important limitation of the sector in the Region.

3.16 STATE OF WATER RESOURCES

The pollution of water resources constitutes one of the most important environmental problems in the Region of the Americas, representing a human health hazard and serious damage to the environment in general.

A gradual deterioration of water resource is observed in almost all the countries of the Region as a consequence of increase population, economic development that is unaware of or gives little importance to the environment, and urbanization. In the majority of the cases attention has not been given to the adequate disposal of domestic and industrial waste.

The problem is exacerbated by the misuse of natural resources, indiscriminate utilization of agricultural chemicals, industrial waste discharged into rivers without treatment, and mining, all of which compromises the sustainability of water resources.

The availability of the water resources is reaching critical levels for many countries of the Region, either by quantity and/or by contamination of the bodies of water. This is the case of El Salvador where in 1994 the availability of the water resource for the population of the country was 3,500 m3/ per capita, the lowest availability of all the Central American countries. This created serious marginal water shortage problems, aggravated over the years by drought and deterioration in the natural channels by floods and avalanches. The problem is compounded by the contamination of the bodies of

surface water in the country, which is estimated to be around 90%, as a result of domestic, industrial, agroindustrial, and hospital effluents.

Other countries like Brazil are privileged in the quantity of water resources, which they have, since it has 5,619 km3 of rain annually that reflects an availability of 35,800 m3/ per capita/year estimated for 1996. However, the distribution of the resource is irregular and only 20% is available to meet the demands of 95% of the population, of which around 78% live in urban areas. The problem worsens as a result of bad management of the resource, especially in the northeastern region of the country, where the drinking water supply systems operate intermittently. In 1998, two-draft legislation was approved that provided the basis for the implementation of a Water Resources Management System to help solve the serious problems of contamination, drought and floods in the watersheds.

Mexico has made progress in the management of its water resources, through a planning process that considers the management and preservation of watersheds, and the participation of users in actions related to the proper use and preservation of the resources fundamental. Mexico has abundant water resources considering that in 1998 the theoretical availability per inhabitant was 4,977 m3/year. However, the distribution of the resource is heterogeneous in relation to geographical distribution and the time of the year, when the region has 60% of the population with only 25% of rainwater. Aquifers are an important source of water supply of which a considerable number is submitted to excessive exploitation, with the consequent problem of saline intrusion, mainly in those located in the coastal states of the country. The quality of the bodies of surface water is variable and needs greater attention considering that 89% of organic discharge, originating from the greatest concentration of the population, and industrial activities takes place in 20 watersheds.

The countries of the Caribbean present a special situation by their geological, geographical, and hydrologic characteristics. The bodies of surface water are usually absent and ground aquifers constitute not only the principal source but, in many of the cases, the only sources of water supply for the population. Many countries of the Caribbean experience shortage of drinking water, among these Barbados, which is classified within the United Nations Convention to Combat Desertification and Drought. The situation worsens as a result of an increase in demand, especially by the tourism sector and to a lesser extent by the industrial sector. The countries of the Caribbean have been considering several strategies to counteract this situation, among them the construction of desalinization plants and water resource conservation strategies through measures to reduce physical losses and unrecorded water. Other approaches include the use of tanks and parallel systems for non-potable water, the distribution of devices for conserving water and minimizing non-efficient use, and consumer education.

In the United States and Canada there is great concern over the contamination of bodies of surface water and ground aquifers by industrial, mining, and agricultural discharges, in spite of strict legislation. The principal problem is water runoff that carries major pollutants toward the bodies of water that are utilized for the water supply. The concern is centered on the quality of the water, not only from the bacteriological standpoint, but also due to chemical contamination produced by heavy metals and pesticides. In the United States and Canada a problem with the presence of Cryptosporidium and Giardia occurred in the last decade in bodies of water (Lake Michigan), and in some cases in the drinking water systems (Milwaukee, Wisconsin). This has resulted in increased concern over the control of protozoa in drinking water, some of which are not eliminated with the chlorination of the water, making it necessary to incorporate new technologies in the treatment processes. Furthermore, recent droughts in some areas of the United States have created problems in the supply and demand of the resource.

The reaction of the countries of the Americas in light of these problems is varied, as is the level of economic and social development, and environmental education existing in the different countries of the Region.

In an effort to cope with the deterioration in water resources, agencies or ministries responsible for the

attention of these problems have been created. These include the United States Agency for the Protection of the Environment (USEPA), the Company of Technology of Environmental Sanitation (CETESB) in Brazil, the National Commission of Water in Mexico (CNA), the Bureau of Environmental Sanitation (DIGESA) in Peru, among others. The Pan American Center for Sanitary Engineering and Environmental Sciences of PAHO (CEPIS) actively participates with these agencies in the protection of water resources.

3.17 CURRENT STATE OF TECHNOLOGY

The countries of Latin America and the Caribbean are very interested in the application of appropriate technologies. These include utilization of groundwater, simplified drinking water treatment plants, disinfection of water with gases, *in situ* generated oxidants and acceptable systems to provide drinking water to dwellings without household connections. In addition, there has been interest in stabilization ponds, upflow reactors for wastewater treatment; latrines and septic tanks improved for *in situ* excreta disposal. PAHO, through CEPIS, provides important technical cooperation with regard to the use, application, and adaptation of simplified and appropriate technologies.

In the countries and developed areas of the Region, technology for drinking water production and distribution, collection, treatment, and disposal of wastewater has become more complex. High employment and high wages in these countries have created a great deal of interest in automation and

computerized controls. This is increasing capital requirements necessary for building and equipping water supply and sanitation systems. The result is that the distance between technologies and solutions applied in the developed areas increasingly differs from the ones applied in underdeveloped areas.

The majority of the countries of Latin America and the Caribbean have areas in their territories in which the population lacks the economic and social development necessary for coping with expenditures, that makes it possible for them to have these services following the model of the developed countries.

On the other hand, there has been an increase in the supply of materials and equipment for work in drinking water supply, wastewater treatment and disposal systems which facilitates the design and construction of systems that adapt well to the conditions of each region or locality.

In spite of the general recognition of the need for incorporating new technologies in the sector, in some countries with high economic growth such as Brazil, the demand for scientific technological advances based on research has been traditionally low. This is due mainly to difficulty in visualizing the compatibility between scientific technological capabilities and economic and social possibilities. Based on investment trends in the sector there are no great incentives for the public and private sector to carry out this task. In Chile, technology development has been promoted by public companies through contracts with the private sector.

In some countries of the Region there are specific entities that have direct relation to the theme that pertain to the water and sanitation sector, as is the case of Mexico with the Mexican Institute of Water Technology (IMTA). In this country the principal source of financing for research is the governmental sector.

The Evaluation 2000 concluded that the drinking water and sanitation sector in the countries should make timely use of technology development in areas of engineering, chemistry, computer, and telecommunications, among others. The mechanisms for development and transfer of technological knowledge should be strengthened and placed at the disposal of an ever-growing number of professionals, technicians and community leaders.

In developing countries it is important to continue to promote the development and utilization of low-cost appropriate technologies, compatible with their situation. The solutions to the serious wastewater treatment problems in Latin America and the Caribbean can only be addressed through the use of low-cost technologies.

It should be taken into account that as a result of globalization, there is increased economic competition between companies and countries, and technological research becomes an important part of the development of the sector.

3.18 SUMMARY OF THE FINDINGS OF THE EVALUATION 2000

Below are the findings of the Evaluation 2000 in the Americas, which summarizes in general terms the situation of the Water Supply and Sanitation Sector.

Group I, consisting of Canada and the United States, managed to solve the problems of drinking water supply and sanitation with satisfactory success, to the point that statistics on coverage are no longer taken, since in these societies it is inconceivable that someone can be without drinking water and sanitation. Dwellings cannot exist without these services and legislation and regulation have been created that declare uninhabitable any dwellings that do not have them or are deficient in them.

The foregoing does not mean that the countries of Group I do not have problems. Having been pioneers in the delivery of these services expenditures have been tremendous in order to cope with growth, and renewal of deteriorated or obsolete infrastructure. In general, continuous deterioration of water resources, linked to the deterioration in environmental quality, forces these countries to apply large resources for monitoring water quality and for its protection. Success in the control of

waterborne diseases is due basically to the application of the "multiple barriers" concept, that gives as much importance to the treatment of drinking water as to the treatment of wastewater and protection of bodies of water. In some areas, the services are periodically affected by natural disasters making it necessary to infuse large investments to rebuild them and to reduce their vulnerability.

The other five groups, located in Latin America and the Caribbean, consist of nations that are still in the development process, and have not been able, in the majority of the cases, to achieve total coverage in the delivery of these services. This is serious, since it indicates that it has not been possible to fulfill universally this basic service, this human right. The problem is even more serious with regards to water quality and protection of water resources.

The previous paragraph does not mean that the experiences or the legacy of the last century was not valuable. Important steps were taken then, and it is necessary to recognize that they worked under very special circumstances, such as intense urbanization and growth, some unprecedented in the history of humankind.

Trying to apply technologies of developed countries indiscriminately and without studying the necessary adaptation to a new reality result in many problems. The most notable failure, low sanitation and low coverage in the treatment of wastewater, amounts to an unawareness of the "multiple barriers" principle. This was dramatized by the cholera epidemic at the end of the 20th Century, which was partly due to the application of wastewater disposal treatment technologies developed for other socio-economic, cultural and technological realities.

With regard to institutional and business aspects important progress was achieved, and should be taken advantage of in the new millennium. Although the regimen was basically state controlled, it always took into account private enterprise in advisory services, consultancies and in the construction of the infrastructure.

At the end of the 20th Century some countries, increased the participation of private enterprises in the operation, administrative management, billing and collection, and financing of the services. In some cases, over a period of time, service concessions held by public companies were given over to private enterprises. Although this privatization process tends to take advantage of the efficiency and flexibility of private enterprise in the delivery of services, it faces difficulties. The problems include the lack of experience by the public sector in the regulation of these services, and inexperience by private enterprise, in the ways of subsidizing poor populations that cannot pay for these services. Despite these difficulties, and in light of the failure to achieve universal coverage in the previous century under the predominantly state scheme, a great deal of importance continues to be given to the role that private enterprise can play in the provision of these services in the new millennium. The success achieved by private enterprise in the provision of other goods and services is the basis for this rational.

Part IV

4.1 THE NEW MILLENNIUM

There is no doubt that the new millennium will start with new demands and new requirements for cities, towns, communities, and people. Maximum advantage should be taken of the experiences gained, by carefully analyzing the successes and mistakes made in the past, and trying to take maximum advantage of existing strengths and correct or diminish the weaknesses of the sector.

TH NEW MILLENIUM

It is observed that in the Region of the Americas, as well as in all the other regions of the world, there is a correlation between the degree of economic and social development and the quality of drinking water and sanitation service. Another way to look at this relation is to recognize that drinking water and sanitation service meets a basic human need, indispensable to achieve the basic quality of life of the people and society in general. Even more so, this service constitutes a basic human right, and when it is not available it is a failure with respect to human rights.

It is improbable that the countries that experience economic and social deterioration in their internal situation can have good drinking water and sanitation services, since the efficiency of these services is related to good management of economic, social, and environmental problems in which health is included.

To be able to meet the general needs of the Region, it is important to identify the opportunities, as well as the factors that will limit or promote an increase in public and private investments in the sector during the coming years.

4.2 CHALLENGES

The challenge that Canada and United States face is that of maintaining universal coverage with continuous service and good quality. This implies large investments to deal with growth, and renewal of infrastructures; and to face environmental problems, manifested mainly by the pollution of water resources, both ground and surface, increasingly difficult, and expensive to resolve. These countries have the advantage of beginning the millennium with a stable economy. From the standpoint of service to the user, they continue to identify it as a solution to the problem of housing, since the individual that acquires housing knows that these services are reliable. The problem of housing, and people who cannot cope with the cost of the same (homeless) is widely debated. Excellent financial mechanisms have been created

to support people who can afford housing, who are the majority, and agencies and institutions, both public and private and NGOs to support the homeless in solving its housing problem. The collaboration or solidarity of local governments and religious communities is very common in programs to solve these problems.

The principle applied in these countries looks very simple, but is very important, and can serve as guide to the rest of the Region: housing and services have a cost and it is necessary to pay that cost. Otherwise, the services would not be capable of being financed, which means that if water and sanitation are given, there is never going to be universal service of good quality if the business concept and the recovery of costs are lost.

The challenge that the countries of Latin America and the Caribbean face at the beginning of the millennium is more complex. The fundamental problem has been the lack of recovery costs and the lack of resources to cope with investments and mainly, operating expenses. It is obvious that many of the aforementioned criteria with regard to the previous group function when poverty is not extensive. A small group of rich cannot help a great majority of poor. In these cases solidarity does not solve the problems, and it is necessary to think in ways of increasing production and wealth as a way of improving the quality of life.

Progress achieved in the mass media during the second half of the 20th Century means that the population in need of services is more aware of its marginalization and is more demanding about proposing solutions to their problems. This constitutes the principal challenge that these countries face. On the other hand, the level of education of people has improved, and the possibility to improve their economic situation is greater in the new millennium.

The fact that improvement of sanitary conditions cannot wait for the improvement of the economic situation, forces one to follow the criteria for progressive improvement, in stages, but always protecting health and environment. Here enters the concept of appropriate technologies. In the beginning, if criteria and technologies of the developed countries are applied, then it would not be possible to achieve universal coverage with the speed that the circumstances require.

A significant percentage of the population of Latin America and the Caribbean still lack basic drinking water services and a greater percentage still do not have sanitation services. Within this context, it is important that the countries direct their efforts to correct the present inequities in the sector through approaches, adjustments and mechanisms to expand the impact of public resources, and promote private participation, utilizing effective social mobilization and community participation.

It is important to point out the need for strengthening the drinking water and sanitation sector mainly the steering role function, regulation, and delivery of services, through its respective operating institutions. Sectoral reforms need to be sustained with appropriate legislation to ensure maximum efficiency of the services from the legal perspective, that will give political weight and authority to orient and control the action of both the public and private sector. In addition, establishment or expansion of research and training centers will have to be on par with investments, administrative and institutional improvements.

It is obvious that the providers of drinking water and sanitation services are not responsible for economic progress or for wealth creation. But, it indeed is important that they are aware that, as a part of the society, they should be prominent actors of the productive apparatus, trying to increase to the utmost the importance of the sector within the process of economic development.

Furthermore, in the countries of Latin America and the Caribbean greater importance should be given to drinking water and sanitation services as inputs of industry and trade and sources of employment.

So that services are efficient and effective there is a need to increase not only the ability of the people to pay, but also the will to pay. In this regard, it is fundamental to improve the consultation process with the communities on the required work and on the way of handling the services.

It is important to increase community participation in problem solving. Consequently, mechanisms should be created to facilitate decision-making at the local level, while maintaining support at the central and regional levels, in terms of establishment and compliance with plans and sectoral policies, and in surveillance and certification of the quality of the services.
The 21th Century begins with a global population greater than 6 billion inhabitants, and a population in the `Region of the Americas` greater than 800 million. Increase in the demand for water for agriculture, industry and human consumption is more than ten times greater than the increase at the beginning of the 20th Century, when the population was less than a sixth of the current, and water consumption much smaller.

While the population grows, water resources continue to be the same, but altered in its quality by contamination and in its continuity by urbanization and development of new agricultural areas. As a result, dry season tends to be more prolonged and critical, and avalanches and floods tend to be more frequent and of greater magnitudes.

Control of the pollution of water resources will have to be stricter in the new century, since survival of humankind depends on this control. The lack of adequate wastewater and excreta disposal should be solved, and contamination produced by industry, agriculture, mining and all economic activity in general should be better controlled.

Those that utilize the resource, such as industry, mining, agriculture, trade, and others should compensate for the costs of exploitation and for utilization of the water, in order to generate financial resources that will permit control of watersheds and good management of water resources. Those that contaminate the resources will be sanctioned based on the volume that they discharge, organic matter (BOD), biological and toxic contamination, and by other concepts of contamination. This will be promoted to control contamination in its origin, through better management and treatment of waste before discharging them to sewerage systems or to receptor bodies.

The ever-growing production of synthetic organic compounds has resulted in an increase in the presence of dangerous toxic substances in water. For many countries in the Region, the ability to detect these pollutants in the laboratories for water quality control is very limited. While the pollutants that are controlled are a little more than 100, potential pollutants constitute several thousands. Because of this, a certain group of people is giving preference to the use of bottled water for human consumption, paying a very high price for the product. Furthermore, not all the countries have systems in place to monitor bottled water.

In the 21st Century, the state's role as a provider of services will change as a result of an increase in population, number of communities and systems, as well as technical and administrative complications. The state will be less a provider of services and increasingly a regulator, with responsibility for enforcing the laws and regulations aimed at protecting health and environment, as well as trying to ensure greater equity in the provision of services.

In addition, everything indicates that there will be greater decentralization in the delivery of the services with greater participation of the municipalities and public utilities, communities and private companies.

The Region is beginning to experience the role of the state as regulator of these services. The state has had more experience in the regulation of utility services, transportation and telecommunications. This can be taken advantage of for regulation of the drinking water and sanitation sector.

In the Region of the Americas emergencies caused by natural disasters, technological and other special situations are frequent. Seismic movements, hurricanes, floods, epidemics, ruptured lines and electric power supply problems can cause serious problems to water supply and sanitation systems, causing damage to installations that result in stoppages, discontinuity of service, problems for water quality and the environment. In general, the provision of public drinking water supply and sanitation services is quite vulnerable to these situations and there are little preparations for facing them.

In some countries there is an awareness of the importance of preparation to cope with these situ-

ations, including the need for leading studies on the vulnerability of the systems and for taking the steps necessary for reducing this vulnerability. However, there is a need for directing greater efforts to prevent and control situations of this nature, disseminating knowledge and experiences, training personnel, leading studies on vulnerability and investigating alternative solutions for use in case of emergency and disaster. The objective is to ensure that all water and sanitation institutions develop a plan for emergencies.

4.3 TRENDS AND PROSPECTS

Despite not having achieved universal coverage, reliable and safe drinking water service, and efficient sanitation, it should be recognized that the governments of the countries of Latin America in many cases have contributed to the achievements of these services. Services in water coverage increased from 69 million in 1960 to 420 million in 1998 and from 29 million in 1960 to 242 million in 1998 for sewerage. A centralist and statesman like policy facilitated this increase in coverage. However, the same centralism began to decline at a certain point due to inefficiency in the operation of the services, business management, and cost recovery. State resources were increasingly consumed in trying to maintain the functioning of the infrastructure, making it impossible to serve the population still without services. Priority was being given to quantity over quality, and the treatment of wastewater and protection of water resources were neglected. The cholera epidemic at the end of the 20th Century forced countries to give priority to these services.

Without a doubt, in the 21th Century the goal of universalization of water and sanitation services will be achieved. The beginning of the century is characterized by globalization, integration, and opened markets, which create significant possibilities to improve and expand the mechanisms and means of financing investments in the sector. In addition, progress in communications media means that people are no longer isolated, which creates favorable conditions to meet the needs of the population.

Even though governments try to limit massive migration, people move toward the places where they find a better quality of life. However, people are not always willing to stay hoping that the solutions to their problems will arrive soon.

Within this panorama, the role of the state as provider of drinking water and sanitation services will have to change and participation by private enterprise has to increase. People will no longer look to the state to solve their problems, individuals will work towards resolving their own problems, or private groups will participate in the search for a solution.

However, in the final analysis, in order to guarantee equity and well-being to all, the state can never give up total control of the delivery of these services.

Where the state apparatus is efficient in the direct delivery of services, it can continue. This is necessary to initiate good planning to meet the needs of the potential market and recovery costs either through rates or grants.

When the state apparatus fails, action should be taken to achieve efficiency in the quality of the services, and universal coverage. It is here that the state, recognizing its difficulties as provider of a service, but having stewardship over the same, will have to consider giving private enterprise, the opportunity to participate in solving the problems, through its efficiency, business flexibility and access to financial markets.

Here enters the problem of equity and ability to pay. Where there is the ability to pay, the recovery of costs is guaranteed; conversely, bankruptcy occurs if the company collects less than the direct costs. In addition, there has to be efficiency and utilization of appropriate technologies, in order not to incur in unnecessary costs that leads them to charge irrational rates. The state will have to handle two aspects: regulation of the services, and subsidy to the poor, who are not able to pay the cost of the service. This is considered to be fair and reasonable rather than low coverage service in the hands of the state, where it is subsidizing rich and poor, and neglecting those that are not served. Obviously, if

the rich are a few and the poor many, the sector will not function well in the hands of the state, or in the hands of private initiative.

In many rural areas of the Region there are situations where the community organize and create committees to construct water supply line projects. They create a management committee and collect from the users the costs to be able to operate and maintain the system. This is an example of community participation and private enterprise solving the problem. The State intervenes with advisory services in order to improve the technical aspects of the project and the quality of the service. What is interesting is that the project is done by decision of the people, without having to rely on bureaucratic decision-makers.

4.4 PROJECTIONS

A large number of countries in the Region are interested in a relevant transformation of the drinking water and sanitation sector. At the request of the countries, in the last five years, PAHO has carried out 17 sectoral analysis, that have been used to obtain a broad diagnosis of the sectoral situation, to identify strengths and weaknesses, priorities, needs for investments and to propose guidelines for strengthening the sector.

The Evaluation 2000 confirms the findings of the sectoral analysis with regard to the need in a large number of countries to introduce changes that permit the assessment and strengthening of the drinking water and sanitation sector. Unless certain fundamental changes are introduced in the structure, institutional organization, management of companies, strategies for mobilization of resources, priorities and attitude, and attention to contrasts and inequities, progress will continue to be slow in the sector, seriously limiting the process of economic and social development.

Many countries of the Region have already advanced in the process of creating basic legislation, steering and regulatory entities, decentralization and de-concentration, increase private sector participation, better intra and extra-sectoral coordination, and mechanisms of evaluation, among others. However, in the majority of the countries these actions are in the initial stages and it is estimated that in order to advance, the process must be done in a timely manner, with the will of national policy and external collaboration. In some cases the country has the potential to initiate these changes with their own resources, but the presence of international cooperation gives value to the process, authenticate actions and overcome certain resistances.

The social benefits that are derived from proficient operation of the sector are widely demonstrated. Countries should take advantage of the great experiences that already exists in the Region and adapt them to the special feature of their individual country.

There is concern in the Region over the future of water supply and sanitation services. At the political and decision-making level, this has been manifested at multiple international meetings, including some of Heads of State.

The Declaration of the Santa Cruz de la Sierra Conference, constitutes a manifesto of the importance of drinking water and sanitation for all, and can be useful in identifying the steps to initiate activities for improving drinking water and sanitation services in the 21th Century. The Plan of Action to Improve Access and Drinking Water Quality which was derived from the Conference plays an important catalytic role to induce the opportunities that offer the essential conditions that meet the needs of the sector, within the framework of equity.

4.5 THE FUTURE OF THE SECTOR

The requirements needed for promoting the development of the sector in the future, are summarized in the chapter Prospects of the Sector in the Country Analytical Report prepared by the countries of the Region for the Evaluation 2000 and found in CEPIS's database.

Based on the results of the Evaluation 2000, to improve drinking water supply and sanitation services in the new millennium focus should be on the following aspects:

- Modernization of the sector and institutionalization of the steering role, with a view to increasing coverage, quality, and efficiency of water supply and sanitation services, emphasizing management improvement, and facilitating the participation of civil society, especially private initiative.
- Regulation of services should consider, in addition to health protection and conservation of natural resources, the diversity of markets, evaluating variables that include size of municipality, forms of organization, and degree of development, especially for small localities and peri-urban and rural areas.
- Strengthening national capacities mainly the regulatory institutions and regulatory entities.
- Focus should be on systems of control, monitoring, and certification of the quality of services, either on the part of the companies or directly by the state.
- Financial support should be made through resources from the current income of the countries (supply) and the subsidies permitted by public service law (demand). These subsidies should be offered where positive externalities or social benefits are maximized and regressive distributive effects are minimized. In addition, as in every business activity, drinking water services in the medium term, should be financed exclusively from the sale of the product. The exception would be that less priviledged communities that lack the ability to pay should be backed with direct or indirect subsidies, in order to promote the social profits of the sector.
- In view of the fact, that public and private entities that provide drinking water supply and sanitation services carry out a business activity, they should be treated legally, fiscally and administratively as any other company or commercial entity, with similar rights and duties.
- Taking into account that decentralization does not generate efficiency with the transfer of responsibility, municipalities are still not prepared to meet this challenge. From the local perspective the following options should be considered in order to achieve efficiency: (i) to learn in the process; (ii) to receive support and technical assis-

tance in service management, and (iii) to purchase management in the market, through private sector linkage to the management of the systems.

- Stimulate investment and rehabilitation of the water supply and sanitation infrastructure in order to improve efficiency of the systems and to reactivate economic growth, considering that the investment in infrastructure increases productivity and stimulates the companies that participate.
- Wastewater treatment should be promoted considering the negative impact it has on health and the environment.

In the future the supply of water and sanitation services can be successful if the following is achieved:

- Self-reliant operating agencies from the technical and economic standpoint that present continuity in its projects and programs.
- A society convinced of the importance of its role in the efficient use of the services, in the preservation of natural resources, and in paying for the services.
- Dynamic programs to increase coverage in peri-urban and rural areas through active participation of the users in the operation and maintenance of the infrastructure, with direct support in its construction and even maintenance through justified and effective subsidies.
- A competent governmental authority who is responsible for efficient management of the water resources of the country, including the protection of watersheds in terms of quantity and quality of the resource.

Part V

ANNEXES

TABLE 7
Urban Population - Drinking Water Supply
(in Thousands of Inhabitants)

Groups	Total urb.	Connect.	% Conn.	E. access	% E. access	Urb. serv.	% Urb. serv.	Urb. unserv.	% Urb. unserv.
GROUP I									
CANADA	23959.417	23959.417	100.00	0.000	0.00	23959.417	100.00	0.000	0.00
UNITED STATES OF AMERICA	185592.200	185592.200	100.00	0.000	0.00	185592.200	100.00	0.000	0.00
TOTAL GROUP I	209551.617	209551.617	100.00	0.000	0.00	209551.617	100.00	0.000	0.00
GROUP II									
BRAZIL	126773.000	114907.000	90.64	6361.000	5.02	121268.000	95.66	5505.000	4.34
MEXICO	70458.800	65735.000	93.30	811.500	1.15	66546.500	94.45	3912.300	5.55
TOTAL GROUP II	197231.800	180642.000	91.59	7172.500	3.64	187814.500	95.23	9417.300	4.77
GROUP III									
BOLIVIA	4770.000	4169.000	87.40	272.000	5.70	4441.000	93.10	329.000	6.90
COLOMBIA	28719.000	25619.000	89.21	2525.620	8.79	28144.620	98.00	574.380	2.00
ECUADOR	7635.000	5872.000	76.91	348.000	4.56	6220.000	81.47	1415.000	18.53
PERU	16969.600	12927.600	76.18	1807.800	10.65	14735.400	86.83	2234.200	13.17
VENEZUELA	18889.000	15802.000	83.66	171.000	0.91	15973.000	84.56	2916.000	15.44
TOTAL GROUP III	76982.600	64389.600	83.64	5124.420	6.66	69514.020	90.30	7468.580	9.70
GROUP IV									
ARGENTINA	32481.000	23385.000	72.00	4126.000	12.70	27511.000	84.70	4970.000	15.30
CHILE	12723.000	12112.000	95.20	496.000	3.90	12608.000	99.10	115.000	0.90
PARAGUAY	2905.127	2003.680	68.97	33.470	1.15	2037.150	70.12	867.977	29.88
URUGUAY	2919.480	2735.491	93.70	132.149	4.53	2867.641	98.22	51.839	1.78
TOTAL GROUP IV	51028.607	40236.171	78.85	4787.619	9.38	45023.791	88.23	6004.816	11.77
GROUP V									
BELIZE	120.100	119.620	99.60	0.480	0.40	120.100	100.00	0.000	0.00
COSTA RICA	1440.272	1432.700	99.47	1.200	0.08	1433.900	99.56	6.372	0.44
CUBA	8376.000	6994.300	83.50	1236.500	14.76	8230.800	98.27	145.200	1.73
DOMINICAN REPUBLIC	5260.500	3235.200	61.50	1814.900	34.50	5050.100	96.00	210.400	4.00
EL SALVADOR	3124.670	2696.620	86.30	190.580	6.10	2887.201	92.40	237.469	7.60
GUATEMALA	3879.000	3388.000	87.34	443.000	11.42	3831.000	98.76	48.000	1.24
HAITI	2614.820	392.274	15.00	884.681	33.83	1276.955	48.84	1337.865	51.16
HONDURAS	2788.120	2481.427	89.00	133.312	4.78	2614.740	93.78	173.380	6.22
NICARAGUA	2514.300	2219.100	88.26	169.500	6.74	2388.600	95.00	125.700	5.00
PANAMA	1525.140	1323.120	86.75	13.736	0.90	1336.856	87.65	188.284	12.35
PUERTO RICO	3702.000	3702.000	100.00	0.000	0.00	3702.000	100.00	0.000	0.00
TOTAL GROUP V	35344.922	27984.362	79.18	4887.890	13.83	32872.252	93.00	2472.670	7.00
GROUP VI									
ANGUILLA	8.848	3.975	44.93	1.339	15.13	5.314	60.06	3.534	39.94
ANTIGUA & BARBUDA	42.000	38.000	90.48	2.000	4.76	40.000	95.24	2.000	4.76
ARUBA	72.000	72.000	100.00	0.000	0.00	72.000	100.00	0.000	0.00
BAHAMAS	248.000	171.000	68.95	73.200	29.52	244.200	98.47	3.800	1.53
BARBADOS	270.000	269.270	99.73	0.700	0.26	269.970	99.99	0.030	0.01
BERMUDA	64.000	–	–	–	–	–	–	–	–
CAYMAN ISLANDS	34.000	–	–	–	–	–	–	–	–
DOMINICA	19.000	18.580	97.79	0.420	2.21	19.000	100.00	0.000	0.00
FRENCH GUIANA	122.850	101.632	82.73	5.875	4.78	107.507	87.51	15.343	12.49
GRENADA	9.130	8.520	93.32	0.370	4.05	8.890	97.37	0.240	2.63
GUADALOUPE	422.500	414.000	97.99	0.000	0.00	414.000	97.99	8.500	2.01
GUYANA	180.000	165.000	91.67	12.000	6.67	177.000	98.33	3.000	1.67
JAMAICA	1410.560	832.936	59.05	545.605	38.68	1378.540	97.73	32.020	2.27
MARTINIQUE	369.656	–	–	–	–	–	–	–	–
MONTSERRAT	5.000	4.900	98.00	0.100	2.00	5.000	100.00	0.000	0.00
NETHERLANDS ANTILLES	138.402	–	–	–	–	–	–	–	–
SAINT KITTS & NEVIS	33.500	24.133	72.04	8.877	26.50	33.010	98.54	0.490	1.46
SAINT LUCIA	147.100	110.400	75.05	33.800	22.98	144.200	98.03	2.900	1.97
SAINT VINCENT & THE GRENADINES	61.924	45.260	73.09	12.400	20.02	57.660	93.11	4.264	6.89
SURINAME	296.753	268.858	90.60	22.553	7.60	291.411	98.20	5.342	1.80
TRINIDAD & TOBAGO	1263.990	830.852	65.73	256.036	20.26	1086.888	85.99	177.102	14.01
TURKS & CAICOS ISLANDS	20.000	15.500	77.50	4.500	22.50	20.000	100.00	0.000	0.00
VIRGIN ISLANDS (UK)	19.482	18.945	97.24	0.099	0.51	19.044	97.75	0.438	2.25
VIRGIN ISLANDS (USA)	49.113	–	–	–	–	–	–	–	–
TOTAL GROUP VI	5307.808	3413.761	73.37	979.873	21.06	4393.634	94.43	259.003	5.57
TOTAL AMERICAS	**575447.354**	**526217.511**	**91.55**	**22952.302**	**3.99**	**549169.813**	**95.54**	**25622.370**	**4.46**
TOTAL LAC	**365895.737**	**316665.894**	**86.70**	**22952.302**	**6.28**	**339618.196**	**92.98**	**25622.370**	**7.02**

TABLE 8
Rural Population - Drinking Water Supply
(in Thousands of Inhabitants)

Groups	Total rural.	Connnect.	% Connect.	E. access	% E. access	Rural serv.	% Rural serv.	Rural unserv.	% Rural unserv.
GROUP I									
CANADA	6462.080	2435.708	37.69	3976.667	61.54	6412.375	99.23	49.705	0.77
UNITED STATES OF AMERICA	76690.612	76690.612	100.00	0.000	0.00	76690.612	100.00	0.000	0.00
TOTAL GROUP I	83152.692	79126.320	95.16	3976.667	4.78	83102.987	99.94	49.705	0.06
GROUP II									
BRAZIL	35017.000	6884.000	19.66	15865.000	45.31	22749.000	64.97	12268.000	35.03
MEXICO	25337.700	15683.500	61.90	672.100	2.65	16355.600	64.55	8982.100	35.45
TOTAL GROUP II	60354.700	22567.500	37.39	16537.100	27.40	39104.600	64.79	21250.100	35.21
GROUP III									
BOLIVIA	3180.000	967.000	30.41	432.000	13.58	1399.000	43.99	1781.000	56.01
COLOMBIA	12050.000	5024.000	41.69	3772.500	31.31	8796.500	73.00	3253.500	27.00
ECUADOR	4540.000	1907.000	42.00	428.000	9.43	2335.000	51.43	2205.000	48.57
PERU	7831.100	2286.600	29.20	1681.600	21.47	3968.200	50.67	3862.900	49.33
VENEZUELA	2213.000	1350.000	61.00	209.000	9.44	1559.000	70.45	654.000	29.55
TOTAL GROUP III	29814.100	11534.600	38.69	6523.100	21.88	18057.700	60.57	11756.400	39.43
GROUP IV									
ARGENTINA	4097.000	1124.000	27.43	98.000	2.39	1222.000	29.83	2875.000	70.17
CHILE	2197.000	995.000	45.29	448.000	20.39	1443.000	65.68	754.000	34.32
PARAGUAY	2500.347	276.938	11.08	44.000	1.76	320.938	12.84	2179.409	87.16
URUGUAY	295.810	166.711	56.36	108.769	36.77	275.481	93.13	20.329	6.87
TOTAL GROUP IV	9090.157	2562.649	28.19	698.769	7.69	3261.419	35.88	5828.738	64.12
GROUP V									
BELIZE	118.400	74.240	62.70	22.380	18.90	96.620	81.60	21.780	18.40
COSTA RICA	1900.637	1547.900	81.44	191.600	10.08	1739.500	91.52	161.137	8.48
CUBA	2761.700	1064.100	38.53	1047.200	37.92	2111.300	76.45	650.400	23.55
DOMINICAN REPUBLIC	2958.000	733.600	24.80	1416.900	47.90	2150.500	72.70	807.500	27.30
EL SALVADOR	3032.110	506.362	16.70	260.810	8.60	767.172	25.30	2264.938	74.70
GUATEMALA	7209.000	3454.000	47.91	1614.000	22.39	5068.000	70.30	2141.000	29.70
HAITI	5119.180	1238.760	24.20	1040.558	20.33	2279.318	44.53	2839.862	55.47
HONDURAS	3201.280	2023.211	63.20	208.083	6.50	2231.294	69.70	969.986	30.30
NICARAGUA	2175.200	313.800	14.43	416.200	19.13	730.000	33.56	1445.200	66.44
PANAMA	1237.090	942.017	76.15	120.011	9.70	1062.028	85.85	175.062	14.15
PUERTO RICO	170.000	0.000	0.00	170.000	100.00	170.000	100.00	0.000	0.00
TOTAL GROUP V	29882.597	11897.990	39.82	6507.743	21.78	18405.732	61.59	11476.865	38.41
GROUP VI									
ANGUILLA									
ANTIGUA & BARBUDA	28.000	22.000	78.57	3.000	10.71	25.000	89.29	3.000	10.71
ARUBA	–	–	–	–	–	–	–	–	–
BAHAMAS	50.000	40.000	80.00	3.000	6.00	43.000	86.00	7.000	14.00
BARBADOS	–	–	–	–	–	–	–	–	–
BERMUDA	–	–	–	–	–	–	–	–	–
CAYMAN ISLANDS	–	–	–	–	–	–	–	–	–
DOMINICA	52.000	29.960	57.62	16.840	32.38	46.800	90.00	5.200	10.00
FRENCH GUIANA	31.140	20.349	65.35	1.684	5.41	22.033	70.75	9.107	29.25
GRENADA	90.970	68.200	74.97	16.200	17.81	84.400	92.78	6.570	7.22
GUADALOUPE	–	–	–	–	–	–	–	–	–
GUYANA	570.000	450.000	78.95	70.000	12.28	520.000	91.23	50.000	8.77
JAMAICA	1149.440	148.048	12.88	534.605	46.51	682.652	59.39	466.788	40.61
MARTINIQUE	22.344	–	–	–	–	–	–	–	–
MONTSERRAT	–	–	–	–	–	–	–	–	–
NETHERLANDS ANTILLES	59.598	–	–	–	–	–	–	–	–
SAINT KITTS Y NEVIS	–	–	–	–	–	–	–	–	–
SAINT VINCENT & THE GRENADINES	51.076	37.230	72.89	10.200	19.97	47.430	92.86	3.646	7.14
SAINT LUCIA	–	–	–	–	–	–	–	–	–
SURINAME	130.377	44.286	33.97	31.138	23.88	75.424	57.85	54.953	42.15
TRINIDAD & TOBAGO									
TURKS AND CAICOS ISLANDS	5.000	3.000	60.00	2.000	40.00	5.000	100.00	0.000	0.00
VIRGIN ISLANDS (USA)	57.887	–	–	–	–	–	–	–	–
VIRGIN ISLANDS (UK)	–	–	–	–	–	–	–	–	–
TOTAL GROUP VI	2297.832	863.073	39.99	688.667	31.91	1551.739	71.91	606.264	28.09
TOTAL AMERICAS	**214592.078**	**128552.132**	**59.94**	**34932.046**	**16.29**	**163484.178**	**76.23**	**50968.071**	**23.77**
TOTAL LAC	**131439.386**	**49425.812**	**37.64**	**30955.379**	**23.58**	**80381.190**	**61.22**	**50918.367**	**38.78**

TABLE 9
Total Population - Drinking Water Supply
(in Thousands of Inhabitants)

Groups	Total population	POPULATION SERVED Connection	%	E. Access	%	Total	%	UNSERVED POP. Total	%
GROUP I									
CANADA	30421.497	26395.125	86.76	3976.667	13.07	30371.792	99.84	49.705	0.16
UNITED STATES OF AMERICA	262282.812	262282.812	100.00	0.000	0.00	262282.812	100.00	0.000	0.00
TOTAL GROUP I	292704.309	288677.937	98.62	3976.667	1.36	292654.604	99.98	49.705	0.02
GROUP II									
BRAZIL	161790.000	121791.000	75.28	22226.000	13.74	144017.000	89.01	17773.000	10.99
MEXICO	95796.500	81418.500	84.99	1483.600	1.55	82902.100	86.54	12894.400	13.46
TOTAL GROUP II	257586.500	203209.500	78.89	23709.600	9.20	226919.100	88.09	30667.400	11.91
GROUP III									
BOLIVIA	7950.000	5136.000	64.60	704.000	8.86	5840.000	73.46	2110.000	26.54
COLOMBIA	40769.000	30643.000	75.16	6298.120	15.45	36941.120	90.61	3827.880	9.39
ECUADOR	12175.000	7779.000	63.89	776.000	6.37	8555.000	70.27	3620.000	29.73
PERU	24800.700	15214.200	61.35	3489.400	14.07	18703.600	75.42	6097.100	24.58
VENEZUELA	21102.000	17152.000	81.28	380.000	1.80	17532.000	83.08	3570.000	16.92
TOTAL GROUP III	106796.700	75924.200	71.09	11647.520	10.91	87571.720	82.00	19224.980	18.00
GROUP IV									
ARGENTINA	36578.000	24509.000	67.00	4224.000	11.55	28733.000	78.55	7845.000	21.45
CHILE	14920.000	13107.000	87.85	944.000	6.33	14051.000	94.18	869.000	5.82
PARAGUAY	5405.474	2280.618	42.19	77.470	1.43	2358.088	43.62	3047.386	56.38
URUGUAY	3215.290	2902.203	90.26	240.918	7.49	3143.121	97.76	72.169	2.24
TOTAL GROUP IV	60118.764	42798.821	71.19	5486.388	9.13	48285.209	80.32	11833.555	19.68
GROUP V									
BELIZE	238.500	193.860	81.28	22.860	9.58	216.720	90.87	21.780	9.13
COSTA RICA	3340.909	2980.600	89.22	192.800	5.77	3173.400	94.99	167.509	5.01
CUBA	11137.700	8058.400	72.35	2283.700	20.50	10342.100	92.86	795.600	7.14
DOMINICAN REPUBLIC	8218.500	3968.800	48.29	3231.800	39.32	7200.600	87.61	1017.900	12.39
EL SALVADOR	6156.780	3202.982	52.02	451.390	7.33	3654.372	59.36	2502.408	40.64
GUATEMALA	11088.000	6842.000	61.71	2057.000	18.55	8899.000	80.26	2189.000	19.74
HAITI	7734.000	1631.034	21.09	1925.239	24.89	3556.273	45.98	4177.727	54.02
HONDURAS	5989.400	4504.638	75.21	341.396	5.70	4846.034	80.91	1143.366	19.09
NICARAGUA	4689.500	2532.900	54.01	585.700	12.49	3118.600	66.50	1570.900	33.50
PANAMA	2762.230	2265.137	82.00	133.748	4.84	2398.885	86.85	363.345	13.15
PUERTO RICO	3872.000	3702.000	95.61	170.000	4.39	3872.000	100.00	0.000	0.00
TOTAL GROUP V	65227.519	39882.351	61.14	11395.633	17.47	51277.984	78.61	13949.535	21.39
GROUP VI									
ANGUILLA	8.848	3.975	44.93	1.339	15.13	5.314	60.06	3.534	39.94
ANTIGUA & BARBUDA	70.000	60.000	85.71	5.000	7.14	65.000	92.86	5.000	7.14
ARUBA	72.000	72.000	100.00	0.000	0.00	72.000	100.00	0.000	0.00
BAHAMAS	298.000	211.000	70.81	76.200	25.57	287.200	96.38	10.800	3.62
BARBADOS	270.000	269.270	99.73	0.700	0.26	269.970	99.99	0.030	0.01
BERMUDA	64.000	–	–	–	–	–	–	–	–
CAYMAN ISLANDS	34.000	–	–	–	–	–	–	–	–
DOMINICA	71.000	48.540	68.37	17.260	24.31	65.800	92.68	5.200	7.32
FRENCH GUIANA	153.990	121.981	79.21	7.559	4.91	129.540	84.12	24.450	15.88
GRENADA	100.100	76.720	76.64	16.570	16.55	93.290	93.20	6.810	6.80
GUADALOUPE	422.500	414.000	97.99	0.000	0.00	414.000	97.99	8.500	2.01
GUYANA	750.000	615.000	82.00	82.000	10.93	697.000	92.93	53.000	7.07
JAMAICA	2560.000	980.984	38.32	1080.209	42.20	2061.193	80.52	498.807	19.48
MARTINIQUE	392.000	–	–	–	–	–	–	–	–
MONTSERRAT	5.000	4.900	98.00	0.100	2.00	5.000	100.00	0.000	0.00
NETHERLANDS ANTILLES	198.000	–	–	–	–	–	–	–	–
SAINT KITTS Y NEVIS	33.500	24.133	72.04	8.877	26.50	33.010	98.54	0.490	1.46
SAINT LUCIA	147.100	110.400	75.05	33.800	22.98	144.200	98.03	2.900	1.97
SAINT VINCENT & THE GRENADINES	113.000	82.490	73.00	22.600	20.00	105.090	93.00	7.910	7.00
SURINAME	427.130	313.144	73.31	53.691	12.57	366.835	85.88	60.295	14.12
TRINIDAD & TOBAGO	1263.990	830.852	65.73	256.036	20.26	1086.888	85.99	177.102	14.01
TURKS AND CAICOS ISLANDS	25.000	18.500	74.00	6.500	26.00	25.000	100.00	0.000	0.00
VIRGIN ISLANDS (UK)	19.482	18.945	97.24	0.099	0.51	19.044	97.75	0.438	2.25
VIRGIN ISLANDS (USA)	107.000	–	–	–	–	–	–	–	–
TOTAL GROUP VI	7605.640	4276.834	62.80	1668.540	24.50	5945.373	87.30	865.267	12.70
TOTAL AMERICAS	**790039.432**	**654769.643**	**82.96**	**57884.348**	**7.33**	**712653.991**	**90.30**	**76590.441**	**9.70**
TOTAL LAC	**497335.123**	**366091.706**	**73.73**	**53907.681**	**10.86**	**419999.387**	**84.59**	**76540.736**	**15.41**

TABLE 10
Characteristics of Urban Drinking Water Systems

Countries	% of drinking water systems that use disinfection	Systems provided with water intermittently		Typical no. of hours per day of drinking water supply
		% Systems	% Population	
GROUP I				
Canada	80.00	0	0	24
USA	100.00	0	0	24
GROUP II				
Brazil	N/A	N/A	N/A	N/A
Mexico	95.00	N/A	N/A	NA
GROUP III				
Bolivia	26.00	N/A	N/A	N/A
Colombia	83.60	N/A	N/A	21.3
Ecuador	60.00	95	N/A	
Peru	80.00	99.0	99.9	13.7
Venezuela	98.00	29	N/A	17
GROUP IV				
Argentina	98.00	N/A	N/A	24
Chile	100.00	0	0	24
Paraguay	100.00	30.0	12.6	N/A
Uruguay	100.00	0	0	24
GROUP V				
Belize	100.00	11.1	46.5	N/A
Costa Rica	100.00	0	0	24
Cuba	83.50	78.9	88.1	12.2
Dominican Republic	95.00	60.0	89.5	18
El Salvador	100.00	82.6	65.2	N/A
Guatemala	25.00	80.0	90.0	6-12
Haiti	20.00	100.0	49.0	6
Honduras	51.00	98.1	97.7	6
Nicaragua	100.00	14.0	11.4	N/A
Panama	100.00	27.1	25.4	20
Puerto Rico	100.00	N/A	N/A	24
GROUP VI				
Anguilla	N/A	0	0	24
Antigua & Barbuda	100.00	0	0	24
Aruba				
Bahamas	100.00	0	0	24
Barbados	100.00	0	0	24
Bermuda				
Cayman Islands				
Dominica	100.00	0	0	24
French Guiana	100.00	0	0	24
Grenada	100.00	0	0	24
Guadalupe	98.00	0	0	24
Guyana	100.00	N/A	N/A	18-24
Jamaica	N/A	N/A	N/A	N/A
Martinique				
Montserrrat	99.95	0	0	24
Netherlands Antilles				
Saint Kitts & Nevis	100.00	0	0	24
Saint Lucia	100.00	100.0	75.0	10-12
Saint Vincent & the Grenadines	N/A	N/A	N/A	N/A
Suriname	0.00	70.0	46.0	N/A
Trinidad & Tobago	100.00	70.0	58.0	12
Turks and Caicos Islands	100.00	0	0	24
Virgin Islands (UK)	N/A	0	0	24
Virgin Islands (USA)				

TABLE 11
Rural Drinking Water Systems in Operation

	% of drinking water functioning/in operation
GROUP I	
Canada	95.00
USA	99.00
GROUP II	
Brazil	N/A
Mexico	N/A
GROUP III	
Bolivia	95.00
Colombia	N/A
Ecuador	70.00
Peru	70.00
Venezuela	73.00
GROUP IV	
Argentina	100.00
Chile	93.00
Paraguay	98.00
Uruguay	6.00
GROUP V	
Belize	N/A
Costa Rica	56.00
Cuba	98.00
Dominican Republic	86.00
El Salvador	N/A
Guatemala	96.00
Haiti	80.00
Honduras	95.00
Nicaragua	95.00
Panama	100.00
Puerto Rico	N/A
GROUP VI	
Anguilla	N/A
Antigua & Barbuda	100.00
Aruba	N/A
Bahamas	100.00
Barbados	N/A
Bermuda	N/A
Cayman Islands	N/A
Dominica	100.00
French Guiana	90.00
Grenada	100.00
Guadalupe	N/A
Guyana	100.00
Jamaica	N/A
Martinique	N/A
Montserrrat	N/A
Netherlands Antilles	N/A
Saint Kitts & Nevis	N/A
Saint Lucia	N/A
Saint Vincent & the Grenadines	N/A
Suriname	60.00
Trinidad & Tobago	N/A
Turks & Caicos Islands	100.00
Virgin Islands (UK)	N/A
Virgin Islands (USA)	N/A

TABLE 12
Urban Population - Sanitation
(in Thousands of Inhabitants)

Groups	Total urb.	Connect.	% Connect.	In situ	% in situ	Urb. serv.	% Urb. serv.	Urban. unserv.	% Urb. unserv.
GROUP I									
CANADA	23959.417	23064.700	96.27	894.717	3.73	23959.417	100.00	0.000	0.00
UNITED STATES OF AMERICA	185592.200	175852.000	94.75	9740.200	5.25	185592.200	100.00	0.000	0.00
TOTAL GROUP I	209551.617	198916.700	94.92	10634.917	5.08	209551.617	100.00	0.000	0.00
GROUP II									
BRAZIL	126773.000	74896.000	59.08	43793.000	34.54	118689.000	93.62	8084.000	6.38
MEXICO	70458.800	52584.500	74.63	8736.300	12.40	61320.800	87.03	9138.000	12.97
TOTAL GROUP II	197231.800	127480.500	64.63	52529.300	26.63	180009.800	91.27	17222.000	8.73
GROUP III									
BOLIVIA	4770.000	2151.000	45.09	1774.000	37.19	3925.000	82.29	845.000	17.71
COLOMBIA	28719.000	22547.000	78.51	5310.430	18.49	27857.430	97.00	861.570	3.00
ECUADOR	7635.000	4687.000	61.39	694.000	9.09	5381.000	70.48	2254.000	29.52
PERU	16969.600	11369.600	67.00	3818.200	22.50	15187.800	89.50	1781.800	10.50
VENEZUELA	18889.000	11793.000	62.43	1633.000	8.65	13426.000	71.08	5463.000	28.92
TOTAL GROUP III	76982.600	52547.600	68.26	13229.630	17.19	65777.230	85.44	11205.370	14.56
GROUP IV									
ARGENTINA	32481.000	17767.000	54.70	10984.000	33.82	28751.000	88.52	3730.000	11.48
CHILE	12723.000	11387.000	89.50	483.000	3.80	11870.000	93.30	853.000	6.70
PARAGUAY	2905.127	384.461	13.23	2080.522	71.62	2464.983	84.85	440.144	15.15
URUGUAY	2919.480	1478.040	50.63	1306.245	44.74	2784.285	95.37	135.195	4.63
TOTAL GROUP IV	51028.607	31016.501	60.78	14853.767	29.11	45870.268	89.89	5158.339	10.11
GROUP V									
BELIZE	120.100	46.960	39.10	38.190	31.80	85.150	70.90	34.950	29.10
COSTA RICA	1440.272	680.837	47.27	597.512	41.49	1278.349	88.76	161.923	11.24
CUBA	8376.000	4059.100	48.46	4066.100	48.54	8125.200	97.01	250.800	2.99
DOMINICAN REPUBLIC	5260.500	1652.000	31.40	3377.000	64.20	5029.000	95.60	231.500	4.40
EL SALVADOR	3124.670	1999.380	63.99	680.370	21.77	2679.750	85.76	444.920	14.24
GUATEMALA	3879.000	3595.000	92.68	79.000	2.04	3674.000	94.72	205.000	5.28
HAITI	2614.820	0.000	0.00	1195.403	45.72	1195.403	45.72	1419.417	54.28
HONDURAS	2788.120	1538.440	55.18	1079.279	38.71	2617.719	93.89	170.401	6.11
NICARAGUA	2514.300	812.900	32.33	1525.400	60.67	2338.300	93.00	176.000	7.00
PANAMA	1525.140	977.029	64.06	527.554	34.59	1504.583	98.65	20.557	1.35
PUERTO RICO	3702.000	2213.000	59.78	1489.000	40.22	3702.000	100.00	0.000	0.00
TOTAL GROUP V	35344.922	17574.646	49.72	14654.809	41.46	32229.455	91.19	3115.467	8.81
GROUP VI									
ANGUILLA	8.848	–	–	8.771	99.13	8.771	99.13	0.077	0.87
ANTIGUA & BARBUDA	42.000	0.000	0.00	41.300	98.33	41.300	98.33	0.700	1.67
ARUBA	72.000	–	–	–	–	–	–	–	–
BAHAMAS	248.000	40.000	16.13	208.000	83.87	248.000	100.00	0.000	0.00
BARBADOS	270.000	5.103	1.89	263.115	97.45	268.218	99.34	1.782	0.66
BERMUDA	64.000	–	–	–	–	–	–	–	–
CAYMAN ISLANDS	34.000	–	–	–	–	–	–	–	–
DOMINICA	19.000	5.290	27.84	11.050	0.00	16.340	86.00	2.660	14.00
FRENCH GUIANA	122.850	40.438	32.92	63.045	51.32	103.483	84.24	19.367	15.76
GRENADA	9.130	1.660	18.18	7.100	77.77	8.760	95.95	0.370	4.05
GUADALOUPE	422.500	190.000	44.97	80.000	18.93	270.000	63.91	152.500	36.09
GUYANA	180.000	60.000	33.33	115.000	63.89	175.000	97.22	5.000	2.78
JAMAICA	1410.560	423.168	30.00	846.336	60.00	1269.504	90.00	141.056	10.00
MARTINIQUE	369.656	–	–	–	–	–	–	–	–
MONTSERRAT	5.000	0.800	16.00	4.000	80.00	4.800	96.00	0.200	4.00
NETHERLANDS ANTILLES	138.402	–	–	–	–	–	–	–	–
SAINT KITTS & NEVIS	33.500	0.000	0.00	32.070	95.73	32.070	95.73	1.430	4.27
SAINT LUCIA	147.100	9.600	6.53	121.500	82.60	131.100	89.12	16.000	10.88
SAINT VINCENT & THE GRENADINES	61.924	1.922	3.10	57.598	93.01	59.520	96.12	2.404	3.88
SURINAME	296.753	0.000	0.00	293.785	99.00	293.785	99.00	2.968	1.00
TRINIDAD & TOBAGO	1263.990	245.916	19.46	1013.012	80.14	1258.928	99.60	5.062	0.40
TURKS AND CAICOS ISLANDS	20.000	0.000	0.00	19.610	98.05	19.610	98.05	0.390	1.95
VIRGIN ISLANDS (UK)	19.482	3.507	18.00	15.585	80.00	19.092	98.00	0.390	2.00
VIRGIN ISLANDS (USA)	49.113	–	–	–	–	–	–	–	–
TOTAL GROUP VI	5307.808	1027.404	22.43	3200.877	69.88	4228.281	92.31	352.356	7.69
TOTAL AMERICAS	**575447.354**	**428563.351**	**74.57**	**109103.300**	**18.98**	**537666.651**	**93.55**	**37053.532**	**6.45**
TOTAL LAC	**365895.737**	**229646.651**	**62.89**	**98468.383**	**26.97**	**328115.034**	**89.85**	**37053.532**	**10.15**

TABLE 13
Rural Population - Sanitation
(in Thousands of Inhabitants)

Groups	Total rural	Connect.	% Connect.	In situ	% in situ	Rural serv.	% Rural unserv.	Rural unserv.	% Rural unserv.
GROUP I									
CANADA	6462.080	298.250	4.62	6114.125	94.62	6412.375	99.23	49.705	0.769
UNITED STATES OF AMERICA	76690.610	25621.926	33.41	51068.684	66.59	76690.610	100.00	0.000	0.000
TOTAL GROUP I	83152.690	25920.176	31.17	57182.809	68.77	83102.985	99.94	49.705	0.06
GROUP II									
BRAZIL	35017.000	1961.000	5.60	16581.000	47.35	18542.000	52.95	16475.000	47.05
MEXICO	25337.700	3310.500	13.07	4811.000	18.99	8121.500	32.05	17216.200	67.95
TOTAL GROUP II	60354.700	5271.500	8.73	21392.000	35.44	26663.500	44.18	33691.200	55.82
GROUP III									
BOLIVIA	3180.000	76.000	2.39	1046.000	32.89	1122.000	35.28	2058.000	64.72
COLOMBIA	12050.000	2000.000	16.60	4145.500	34.40	6145.500	51.00	5904.500	49.00
ECUADOR	4540.000	473.000	10.42	1208.000	26.61	1681.000	37.03	2859.000	62.97
PERU	7831.100	1708.100	21.81	1388.000	17.72	3096.100	39.54	4735.000	60.46
VENEZUELA	2213.000	316.000	14.28	736.000	33.26	1052.000	47.54	1161.000	52.46
TOTAL GROUP III	29814.100	4573.100	15.34	8523.500	28.59	13096.600	43.93	16717.500	56.07
GROUP IV									
ARGENTINA	4097.000	41.000	1.00	1913.000	46.69	1954.000	47.69	2143.000	52.31
CHILE	2197.000	112.000	5.10	1948.000	88.67	2060.000	93.76	137.000	6.24
PARAGUAY	2500.347	0.000	0.00	1163.135	46.52	1163.135	46.52	1337.212	53.48
URUGUAY	295.810	6.099	2.06	243.968	82.47	250.067	84.54	45.743	15.46
TOTAL GROUP IV	9090.157	159.099	1.75	5268.103	57.95	5427.202	59.70	3662.955	40.30
GROUP V									
BELIZE	118.400	0.000	0.00	29.960	25.30	29.960	25.30	88.440	74.70
COSTA RICA	1900.637	21.174	1.11	1825.000	96.02	1846.174	97.13	54.463	2.87
CUBA	2761.700	213.200	7.72	2103.400	76.16	2316.600	83.88	445.100	16.12
DOMINICAN REPUBLIC	2958.000	0.000	0.00	2327.900	78.70	2327.900	78.70	630.100	21.30
EL SALVADOR	3032.110	0.000	0.00	1527.573	50.38	1527.573	50.38	1504.537	49.62
GUATEMALA	7209.000	1079.000	14.97	4061.000	56.33	5140.000	71.30	2069.000	28.70
HAITI	5119.180	0.000	0.00	843.389	16.48	843.389	16.48	4275.791	83.52
HONDURAS	3201.280	0.000	0.00	1584.635	49.50	1584.635	49.50	1616.645	50.50
NICARAGUA	2175.200	0.000	0.00	1218.100	56.00	1218.100	56.00	957.100	44.00
PANAMA	1237.090	3.305	0.27	1067.296	86.27	1070.600	86.54	166.490	13.46
PUERTO RICO	170.000	10.000	5.88	160.000	94.12	170.000	100.00	0.000	0.00
TOTAL GROUP V	29882.597	1326.679	4.44	16748.253	56.05	18074.932	60.49	11807.665	39.51
GROUP VI									
ANGUILLA									
ANTIGUA & BARBUDA	28.000	0.300	1.07	26.100	93.21	26.400	94.29	1.600	5.71
ARUBA	–	–	–	–	–	–	–	–	–
BAHAMAS	50.000	2.000	4.00	48.000	96.00	50.000	100.00	0.000	0.00
BARBADOS	–	–	–	–	–	–	–	–	–
BERMUDA	–	–	–	–	–	–	–	–	–
CAYMAN ISLANDS	–	–	–	–	–	–	–	–	–
DOMINICA	52.000	0.000	0.00	39.000	75.00	39.000	75.00	13.000	25.00
FRENCH GUIANA	31.140	8.014	25.74	9.791	31.44	17.805	57.18	13.335	42.82
GRENADA	90.970	0.000	0.00	88.240	97.00	88.240	97.00	2.730	3.00
GUADALOUPE	–	–	–	–	–	–	–	–	–
GUYANA	570.000	0.000	0.00	460.000	80.70	460.000	80.70	110.000	19.30
JAMAICA	1149.440	321.843	28.00	724.147	63.00	1045.990	91.00	103.450	9.00
MARTINIQUE	22.344	–	–	–	–	–	–	–	–
MONTSERRAT	–	–	–	–	–	–	–	–	–
NETHERLANDS ANTILLES	59.598	–	–	–	–	–	–	–	–
SAINT KITTS & NEVIS	–	–	–	–	–	–	–	–	–
SAINT LUCIA	–	–	–	–	–	–	–	–	–
SAINT VINCENT & THE GRENADINES	51.076	1.583	3.10	47.449	92.90	49.032	96.00	2.044	4.00
SURINAME	130.377	0.000	0.00	73.112	56.08	73.112	56.08	57.265	43.92
TRINIDAD & TOBAGO	–	–	–	–	–	–	–	–	–
TURKS AND CAICOS ISLANDS	5.000	0.000	0.00	4.700	94.00	4.700	94.00	0.300	6.00
VIRGIN ISLANDS (UK)	–	–	–	–	–	–	–	–	–
VIRGIN ISLANDS (USA)	57.887	–	–	–	–	–	–	–	–
TOTAL GROUP VI	2297.832	333.740	15.47	1520.539	70.46	1854.280	85.93	303.723	14.07
TOTAL AMERICAS	**214592.078**	**37584.294**	**17.53**	**110635.204**	**51.59**	**148219.498**	**69.12**	**66232.751**	**30.88**
TOTAL LAC	**131439.386**	**11664.118**	**8.88**	**53452.395**	**40.71**	**65116.514**	**49.59**	**66183.043**	**50.41**

TABLE 14
Total Population - Sanitation
(in Thousands of Inhabitants)

Groups	Total urb.	Connect.	% Connect.	In situ	% in situ	Urb. serv.	% Urb. serv.	Urban. unserv.	% Urb. unserv
GROUP I									
CANADA	30421.497	23362.950	76.80	7008.842	23.04	30371.792	99.84	49.705	0.16
UNITED STATES OF AMERICA	262282.810	201473.926	76.82	60808.884	23.18	262282.810	100.00	0.000	0.00
TOTAL GROUP I	292704.307	224836.876	76.81	67817.726	23.17	292654.602	99.98	49.705	0.02
GROUP II									
BRAZIL	161790.000	76857.000	47.50	60374.000	37.32	137231.000	84.82	24559.000	15.18
MEXICO	95796.500	55895.000	58.35	13547.300	14.14	69442.300	72.49	26354.200	27.51
TOTAL GROUP II	257586.500	132752.000	51.54	73921.300	28.70	206673.300	80.23	50913.200	19.77
GROUP III									
BOLIVIA	7950.000	2227.000	28.01	2820.000	35.47	5047.000	63.48	2903.000	36.52
COLOMBIA	40769.000	24547.000	60.21	9455.930	23.19	34002.930	83.40	6766.070	16.60
ECUADOR	12175.000	5160.000	42.38	1902.000	15.62	7062.000	58.00	5113.000	42.00
PERU	24800.700	13077.700	52.73	5206.200	20.99	18283.900	73.72	6516.800	26.28
VENEZUELA	21102.000	12109.000	57.38	2369.000	11.23	14478.000	68.61	6624.000	31.39
TOTAL GROUP III	106796.700	57120.700	53.49	21753.130	20.37	78873.830	73.85	27922.870	26.15
GROUP IV									
ARGENTINA	36578.000	17808.000	48.69	12897.000	35.26	30705.000	83.94	5873.000	16.06
CHILE	14920.000	11499.000	77.07	2431.000	16.29	13930.000	93.36	990.000	6.64
PARAGUAY	5405.474	384.461	7.11	3243.657	60.01	3628.118	67.12	1777.356	32.88
URUGUAY	3215.290	1484.139	46.16	1550.213	48.21	3034.353	94.37	180.937	5.63
TOTAL GROUP IV	60118.764	31175.600	51.86	20121.870	33.47	51297.471	85.33	8821.293	14.67
GROUP V									
BELIZE	238.500	46.960	19.69	68.150	28.57	115.110	48.26	123.390	51.74
COSTA RICA	3340.909	702.011	21.01	2422.512	72.51	3124.523	93.52	216.386	6.48
CUBA	11137.700	4272.300	38.36	6169.500	55.39	10441.800	93.75	695.900	6.25
DOMINICAN REPUBLIC	8218.500	1652.000	20.10	5704.900	69.42	7356.900	89.52	861.600	10.48
EL SALVADOR	6156.780	1999.380	32.47	2207.943	35.86	4207.323	68.34	1949.457	31.66
GUATEMALA	11088.000	4674.000	42.15	4140.000	37.34	8814.000	79.49	2274.000	20.51
HAITI	7734.000	0.000	0.00	2038.793	26.36	2038.793	26.36	5695.208	73.64
HONDURAS	5989.400	1538.440	25.69	2663.915	44.48	4202.355	70.16	1787.045	29.84
NICARAGUA	4689.500	812.900	17.33	2743.500	58.50	3556.400	75.84	1133.100	24.16
PANAMA	2762.230	980.334	35.49	1594.850	57.74	2575.184	93.23	187.046	6.77
PUERTO RICO	3872.000	2223.000	57.41	1649.000	42.59	3872.000	100.00	0.000	0.00
TOTAL GROUP V	65227.519	18901.325	28.98	31403.061	48.14	50304.386	77.12	14923.133	22.88
GROUP VI									
ANGUILLA	8.848	0.000	0.00	8.771	99.13	8.771	99.13	0.077	0.87
ANTIGUA & BARBUDA	70.000	0.300	0.43	67.400	96.29	67.700	96.71	2.300	3.29
ARUBA	72.000	–	–	–	–	–	–	–	–
BAHAMAS	298.000	42.000	14.09	256.000	85.91	298.000	100.00	0.000	0.00
BARBADOS	270.000	5.103	1.89	263.115	97.45	268.218	99.34	1.782	0.66
BERMUDA	64.000	–	–	–	–	–	–	–	–
CAYMAN ISLANDS	34.000	–	–	–	–	–	–	–	–
DOMINICA	71.000	5.290	7.45	50.050	70.49	55.340	77.94	15.660	22.06
FRENCH GUIANA	153.990	48.452	31.46	72.836	47.30	121.288	78.76	32.702	21.24
GRENADA	100.100	1.660	1.66	95.340	95.24	97.000	96.90	3.100	3.10
GUADALOUPE	422.500	190.000	44.97	80.000	18.93	270.000	63.91	152.500	36.09
GUYANA	750.000	60.000	8.00	575.000	76.67	635.000	84.67	115.000	15.33
JAMAICA	2560.000	745.011	29.10	1570.483	61.35	2315.494	90.45	244.506	9.55
MARTINIQUE	392.000	–	–	–	–	–	–	–	–
MONTSERRAT	5.000	0.800	16.00	4.000	80.00	4.800	96.00	0.200	4.00
NETHERLANDS ANTILLES	198.000	–	–	–	–	–	–	–	–
SAINT KITTS Y NEVIS	33.500	0.000	0.00	32.070	95.73	32.070	95.73	1.430	4.27
SAINT LUCIA	147.100	9.600	6.53	121.500	82.60	131.100	89.12	16.000	10.88
SAINT VINCENT & THE GRENADINES	113.000	3.505	3.10	105.047	92.96	108.552	96.06	4.448	3.94
SURINAME	427.130	0.000	0.00	366.897	85.90	366.897	85.90	60.233	14.10
TRINIDAD & TOBAGO	1263.990	245.916	19.46	1013.012	80.14	1258.928	99.60	5.062	0.40
TURKS AND CAICOS ISLANDS	25.000	0.000	0.00	24.310	97.24	24.310	97.24	0.690	2.76
VIRGIN ISLANDS (UK)	19.482	3.507	18.00	15.585	80.00	19.092	98.00	0.390	2.00
VIRGIN ISLANDS (USA)	107.000	–	–	–	–	–	–	–	–
TOTAL GROUP VI	7605.640	1361.144	20.20	4721.417	70.06	6082.560	90.26	656.080	9.74
TOTAL AMERICAS	**790039.432**	**466147.645**	**59.08**	**219738.504**	**27.84**	**685886.149**	**86.91**	**103286.283**	**13.09**
TOTAL LAC	**497335.123**	**241310.769**	**48.61**	**151920.778**	**30.60**	**393231.547**	**79.21**	**103236.576**	**20.79**

TABLE 15
Percentage of Sewerage Effluents with Some Degree of Treatment

	% of sewerage effluents with treatment
GROUP I	
Canada	80.00
USA	100.00
GROUP II	
Brazil	10.00
Mexico	15.40
GROUP III	
Bolivia	30.00
Colombia	10.80
Ecuador	5.00
Peru	14.00
Venezuela	10.00
GROUP IV	
Argentina	10.00
Chile	16.70
Paraguay	8.00
Uruguay	76.92
GROUP V	
Belize	56.70
Costa Rica	4.00
Cuba	18.90
Dominican Republic	48.70
El Salvador	2.00
Guatemala	1.00
Haiti	0.00
Honduras	3.00
Nicaragua	34.00
Panama	18.30
Puerto Rico	100.00
GROUP VI	
Anguilla	N/A
Antigua & Barbuda	100.00
Aruba	N/A
Bahamas	80.00
Barbados	100.00
Bermuda	N/A
Cayman Islands	N/A
Dominica	0.00
French Guiana	65.00
Grenada	0.00
Guadaloupe	40.00
Guyana	50.00
Jamaica	N/A
Martinique	N/A
Montserrat	100.00
Netherlands Antilles	N/A
Saint Kitts & Nevis	N/A
Saint Lucia	46.10
Saint Vincent & the Grenadines	N/A
Suriname	0.10
Trinidad & Tobago	65.00
Turks & Caicos Islands	0.00
Virgin Islands (UK)	0.00
Virgin Islands (USA)	N/A