

**ORGANIZACION PANAMERICANA DE LA SALUD**

---

LIBRARY  
INTERNATIONAL REFERENCE CENTRE  
FOR QUALITY WATER SUPPLY AND  
SANITATION

**REGIONAL CONFERENCE ON WATER  
SUPPLY AND SANITATION**

**Evaluation of the International Drinking  
Water Supply and Sanitation Decade  
and Projections towards the Year 2000**

Puerto Rico, 4-6 de September de 1990



**The Situation of Drinking Water  
Supply and Sanitation in the  
American Region at the End of  
the Decade 1981-1990, and  
Prospects for the Future**

**Volume 1**

**WORLD HEALTH ORGANIZATION  
PAN AMERICAN HEALTH ORGANIZATION  
ENVIRONMENTAL HEALTH PROGRAM**

**SITUATION OF DRINKING WATER SUPPLY AND  
SANITATION IN THE REGION OF THE AMERICAS  
AT THE END OF THE DECADE 1981-1990  
AND PERSPECTIVES FOR THE FUTURE**

**VOLUME 1**

BARCODE  
NEW 8870  
827 AAL90

**WASHINGTON, D. C.  
JULY 1990**

## ACRONYMS

ALCEAPA	Latin American and Caribbean Association of Drinking Water Supply and Sewerage Agencies
ANESAPA	National Association of Drinking Water Supply and Sewerage Agencies (Bolivia)
ANOAPA	National Association of Drinking Water Supply and Sewerage Organs (Mexico)
AyA	Costarican Institute of Water Supply and Sewerage
BDD	British Development Division
CAPRE	Regional Coordinating Committee of Drinking Water and Sanitation Institutions of Central America
CARE	Cooperative for American Relief Everywhere
CARICOM	Caribbean Community
CDB	Caribbean Development Bank
CELADE	Latin American Center for Demography
CENAGUA	National Center for Water (Colombia)
CEPIS	Pan American Center for Sanitary Engineering and Environmental Sciences
CESI	Country External Support Information System
CIDA	Canadian International Development Agency
ECO	Pan American Center for Human Ecology and Health
ESA	External Support Agencies
FINNIDA	Finnish International Development Agency
GDP	Gross Domestic Product
GNP	Gross National Product
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HABITAT	United Nations Conference on Human Settlements, 1976
HFA/2000	Health for All by the Year 2000
IBRD	International Bank for Reconstruction and Development (World Bank)
IDB	Inter-American Development Bank
IDRC	International Development Research Centre (Canada)
IDWSSD/ DECADE	International Drinking Water Supply and Sanitation Decade
KfW	Kreditanstalt für Wiederaufbau
km <sup>2</sup>	kilometer squared
NORAD	Norwegian Agency for International Development
OECS	Organization of Eastern Caribbean States
PAHO/WHO	Pan American Health Organization/World Health Organization
PHC	Primary Health Care
REPIDISCA	Pan American Information and Documentation Network on Sanitary Engineering and Environmental Sciences
SENAPA	National Water Supply and Sewerage Service (Peru)

SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

## CONTENTS

	<i>Page</i>
Foreword .....	vii
Preface .....	ix
Summary .....	xi
I. INTRODUCTION .....	1
II. THE REGION OF THE AMERICAS .....	3
III. EVOLUTION OF THE SECTOR IN THE IDWSSD 1981-1990 .....	8
3.1 National and Regional Goals .....	8
3.2 Cost of the Decade .....	10
3.3 Improvements Attained .....	10
3.3.1 Extension of Coverage and Service Levels .....	10
3.3.2 Deficits and Imbalances Among Services .....	16
3.3.3 Investments Made .....	16
3.3.4 Quality of Water and of the Services .....	17
3.3.5 Wastewater Disposal and Water Pollution .....	18
3.3.6 Impact on Health .....	21
IV. SUB-REGIONAL INITIATIVES .....	22
4.1 Central American Sub-region .....	22
4.2 Andean Sub-region .....	27
4.3 Caribbean Sub-region .....	31
V. THE POST-DECADE .....	36
5.1 Unsatisfied and Potential Demand for Services up to the Year 2000 .....	36
5.2 Restrictions and Limitations to be Overcome .....	39
5.2.1 Political Commitment and Priority of the Sector .....	39
5.2.2 Organization of the Sector and Institutional Development .....	41
5.2.3 Planning .....	43
5.2.4 Financing .....	44
5.2.5 Operation, Maintenance, Rehabilitation and Optimization of Installed Capacity .....	45

5.2.6 Technology .....	46
5.2.7 Community and Women's Participation .....	48
5.2.8 Health Education .....	49
5.2.9 Link to Primary Health Care (PHC) .....	49
5.2.10 Status of the Hydraulic Resources .....	50
5.2.11 Cooperation Among Countries and Institutions .....	50
5.2.12 External Cooperation .....	52
VI. CONCLUSIONS .....	52
VII. THE POST-DECADE CHALLENGES .....	54
REFERENCES .....	57
ANNEXES .....	59

## *FOREWORD*

Since the mid-20th century the countries of Latin America and the Caribbean have paid increasing attention to extending water supply and sanitary services for the disposal of excreta and wastewater to the largest possible number of inhabitants of the Region. The history of the sector's development shows major advances and changes that have been made in the approaches to this problem and thus to health promotion and overall development of the countries.

Concern for such progress has been international in scope, with major repercussions at the political level, especially when goals were formulated for regional action in the 1960s and 1970s. Also, in the early 1980s, when the International Drinking Water Supply and Sanitation Decade was launched, the countries were receptive to it, and embraced its purposes and goals.

The environment in which the water supply and sanitation services develop is characterized by major factors that impact both positively and negatively the sector behavior. In the 1960s and 1970s considerable progress resulted from economic growth. In the 1980s, the sector ran up against the major economic crisis, which led to a setback for the development of and priority accorded water and sanitation services. Population growth, unbridled urbanization, growing poverty, and other factors set back the countries' momentum built up from past efforts to promote growth of the sector. Moreover, the development process itself aggravated major factors that affected the services, such as: the degradation of water resources resulting from human, industrial, and agro-industrial activities, which limited the supply of water resources and increased the costs of water treatment; expansion of the large cities and metropolitan areas, making it necessary to transport water over greater distances, further raising the cost of services; and the limited availability of financial resources, making it difficult to take on new works, especially to expand sewerage services. As a result, the demands grew and the capacity to respond declined.

The evaluation set forth in this document that we are presenting at the Regional Conference in San Juan, Puerto Rico, and the discussion thereof, will provide an opportunity to consider again the importance of this sector. More than in previous periods, it will be important on this occasion for the professionals who plan and manage services to come up with the lines of action that will make it possible to look to the future with more cause for optimism in relation to the situations noted, limitations perceived, and possible solutions. The highest political level in the countries should more clearly recognize the importance of this sector and should accord it greater priority within efforts to ensure the health and well-being of the population, including social and economic betterment.

The Pan American Health Organization, through the Environmental Health Program, and its Pan American Centers CEPIS and ECO, as well as the country personnel assigned to the Country Representative Offices of PAHO, has made every effort to keep alive the actions aimed at fulfilling the goals of the Decade. Their collaboration with the countries has been wide-ranging, and has been adapted to the requirements of the national programs. The countries also collaborated by offering their important experiences and considerable support, thereby contributing to the achievements. PAHO, by promoting and facilitating the development of this evaluation of the Decade, hopes that it results in the best possible judgments and projections, so that the 1990s may see a resurgence in the attention paid to assuring water supply and sanitation for the entire population in our countries, an aspiration consonant with the goals of Health for All by the Year 2000. The document "Action of the Pan American Health Organization in the International Drinking Water Supply and Sanitation Decade, 1981-1990" that will be distributed during the Conference provides details of the various cooperation activities carried out by PAHO in the Decade.

On this occasion I would also like to express my thanks for the efforts carried out in the countries that undertook the national evaluations, which are primarily intended to contribute to the development of the sector at the country level. These evaluations are essential for appropriate review of the advances at regional levels.

Guillermo H. Dávila  
Coordinator  
Environmental Health Program, PAHO/WHO



## *PREFACE*

This document has been prepared by the Environmental Health Program of the Pan American Health Organization/World Health Organization (PAHO/WHO) for presentation in the Regional Conference on Water Supply and Sanitation: Evaluation of the International Decade of Water Supply and Sanitation and Projections Towards the Year 2000, under the auspices of PAHO/WHO in San Juan, Puerto Rico, and scheduled for September 4 to 6, 1990.

This report is part of the documentation for the Conference. Its purpose is to inform on the progress attained by the countries of the Region of the Americas in their efforts to reach the goals they established to increase the coverage with drinking water supply and sanitary wastewater and excreta disposal services in the International Drinking Water Supply and Sanitation Decade, 1981-1990, and to discuss projections and implications for the future.

To the extent possible, a comparative quantitative and qualitative analysis has been presented, based mainly on the information provided by the countries, to the IDWSSD monitoring system until 1988 as well as the national evaluations of the Decade done in 1990. Also included are observations and perceptions of major changes in the processes, attitudes, policies, and other aspects which, it is expected, have had a significant impact on speeding up or slowing down attainment of the goals proposed by the 1977 United Nations Water Conference and the Regional Strategies for achieving Health For All by the Year 2000.

In the general frame of reference for evaluating the Decade, and projections for the future, political, social, and economic factors and international cooperation are of special importance, as are the principal obstacles identified by the countries, such as the limited political commitment and community support, inadequate organization of the sector, the lack of sectoral financial policies, insufficient generation of resources, and the need to improve services. These topics are addressed in detail in other conference documents. Therefore, this presentation deals with those aspects briefly, focusing primarily on the accomplishment of the period from 1981 to 1988, as well as the work remaining to be done.

***SITUATION OF DRINKING WATER SUPPLY AND  
SANITATION IN THE REGION OF THE AMERICAS  
AT THE END OF THE DECADE 1981-1990  
AND PROSPECTS FOR THE FUTURE***

***SUMMARY***

**The Decade and its Achievements**

The International Drinking Water Supply and Sanitation Decade in Latin America and the Caribbean has been carried out during a period of intense change, highlighted by the economic crisis which reduced financial resources for the sector, increasing poverty, and environmental degradation, especially of water resources, due to biological and chemical pollution. Another important factor has been accelerated population growth and distribution, resulting in a disorganized urban expansion primarily increasing the marginal urban areas, where it is estimated that 40% of the urban population, currently resides. These factors have contributed to deterioration of the quality of life for large sectors of the population in most of the countries and have accentuated the lack of basic services, including the provision of drinking water and sanitation.

In addition to the above factors, the water supply and sanitation sector had to face sectoral and institutional shortcomings that are considered to lie at the root of most of its problems, many of which have yet to be resolved, and may continue to be major obstacles after 1990.

In the circumstances noted, the development of water supply and sanitation during the Decade has generally not met all expectations. However, there has been progress in extending services in all countries of the Region. In the first eight years of the Decade, an additional 87 millions people (75 millions in urban areas and 12 millions in rural areas) benefited from water supply services, and an additional 74 millions (61 millions in urban areas and 13 millions in rural areas) received sewerage services and other sanitary means of excreta disposal.

By late 1988 urban water supply services through household connections and public sources (access within 200 meters of dwelling) reached 88% of the population, surpassing the 1990 regional goal of 87%. Urban sewerage services and other means of excreta disposal reached 80% of the target population, surpassing the goal of 79%. In the rural areas, 47% of the population had water supply primarily through public sources, a coverage less than the 55% proposed in the goals for the Decade. Sanitary excreta disposal services were extended to 32% of the population, also less than the proposed goal of 37%. In the last two years, 1989 and 1990, the coverage may have increased slightly. In any case, it must be noted that development was not uniform among the countries, with substantial differences between them. Several countries have not been able to meet their national goals, while others have surpassed them. It is important to take into account that the reported coverage does not necessarily represent

services of adequate quality and quantity, a goal that was recommended by the United Nations Water Conference.

The figures noted are also indicative of the deficits in water supply and sanitation services. As of late 1988, eighty-nine millions people (34 millions in urban areas and 55 millions in rural areas) did not have reasonable access to water supply, and 144 millions (58 millions in the urban areas and 86 in rural areas) lacked adequate wastewater and excreta disposal services.

In addition to expanding coverage, the Decade goals include the provision of water and sanitation with realistic standards of quality and quantity. While there was considerable progress in coverage, the efforts to control the quality of the water and services did not advance to the same extent. In almost all the countries attention has been concentrated more on expanding services and building new systems, than on improving water quality.

Almost all the countries indicate that they have programs for controlling drinking water quality in urban areas, and several in rural areas as well; but in most cases such programs are only partially implemented. In approximately 75% of water supply services, the disinfection processes do not function continuously and effectively; and national standards of quality are not always met.

Most of the countries report having intermittent water supply services, even in major areas of the principal cities which, in addition to indicating shortcomings in operation and maintenance, jeopardizes the integrity of the distribution systems. The water losses in urban systems are estimated at 40% to 60% of the water produced. This situation, in addition to affecting the efficiency and quality of the services, also has negative economic implications.

Discharge of untreated or inadequately treated wastewater pollutes both, surface and groundwater sources for drinking water supply, as well as other uses. At present it is estimated that only 5% to 10% of the sewerage systems have some degree of treatment. In addition to the biological contamination caused by municipal discharges is the chemical contamination produced by wastes from industrial and agricultural activities. Managing and treating urban wastewater is one of the major challenges that the countries will have to face in the coming years. The degradation of water resources and the growing demand for water require that comprehensive intersectoral policies be adopted for water management, including its recovery, conservation, use, and reuse.

Life expectancy at birth, infant mortality and mortality in preschool children, as well as the morbidity and mortality of diseases related to water and sanitation are important indices of a countries' health and social development. These indicators, though they have improved in the course of the Decade in Latin America and the Caribbean are still higher than in the industrialized countries. Several factors may be responsible for the reductions achieved. However, some of the diseases are on the rise, while others have not as yet been studied in detail. In any case, the provision of safe water and sanitary wastewater and excreta disposal that is well planned, programmed, carried out, operated, administered, and utilized contribute to the

reduction of diseases related to deficient water and sanitation, especially when accompanied by pertinent health education.

At the outset of the Decade estimates were made of the investments required to reach the goals proposed by the countries. Although there is no complete information on investments made, the loans granted by the international financial institutions, mainly the IDB and World Bank, and the contributions from bilateral agencies, indicate that such assistance was less than expected, albeit significantly greater than the investments of the 1970s.

### **After the Decade**

After 1990, it is perceived that the countries will have to consider three principal aspects of the future situation. The first consideration in the period after the Decade will continue to be extending the coverage of water supply and sanitation services of adequate quality and quantity to the population without services and those who are poorly served. Considering the yet unserved population in 1988 and the increase in the population to the year 2000, it is expected that 122.9 millions people will require drinking water supply in urban areas, and 79.2 millions in rural areas. Also, 147.4 millions will require sanitation services, primarily in marginal urban areas, where 40% of the population will reside, mostly poor people; and 88.1 millions in the rural areas. The rural population without services is still numerous, and while not increasing rapidly, will require attention. This includes the scattered population, which represents a special challenge.

Together with the concern for extending coverage, the countries will have to consider providing safe water that meets the minimum standards of quality in the countries; this includes surveillance and control programs, the treatment of wastewater, the sanitary disposal of wastewater and excreta as well as biological and chemical water pollution control. This aspect should be related to the comprehensive policies for recovery, preservation, use, and reuse of water.

Finally, another aspect that will require priority attention is the optimization of the services, incorporating the concept of efficient use of water.

### **Limitations on Future Development of the Sector**

In the process of preparing the national evaluations, the countries have analyzed the restrictions that have stood in the way of greater development of the sector in the course of the IDWSSD, paying special attention to the obstacles that would have to be overcome to facilitate the sector's development in the period after the Decade, and fulfillment of the goals of providing water supply and sanitation for all by the year 2000. Among the principal restrictions identified are the following:

- The collective international political commitment made by the countries of the Region, with the launching of the IDWSSD in 1980, was not universally translated to the national level. Fifteen countries consider the lack of governmental policies for the sector to be a major limitation. Therefore, the efforts must be renewed and the decision of the countries reaffirmed to ensure appropriate political recognition of the importance of drinking water supply and sanitation so as to guarantee health and as an essential condition for economic and social development.
- The inadequate organization of the sector and the inefficiencies of its institutions have been identified in several countries as one of the major factors hindering the sector's development. Several countries are carrying out institutional reforms, including the decentralization of services. In this context, the situation of the intermediate and small cities is especially critical; appropriate mechanisms are required to serve them so as to ensure technical and economic feasibility. In most cases, the results of decentralization can only be evaluated after some years have passed. However, there is a felt need for a form of institutional organization that includes functions at the central level, as well as at the other levels, that operate in a systematic and coordinated fashion, with clear definitions of responsibilities and interrelationships, so as to be able to have an optimal impact.
- The shortage of qualified human resources is a problem in most countries. As of late 1988, seventeen countries had limitations in the training of professional personnel, and 18 indicated that they also faced limitations in the training of personnel at sub-professional levels. In the course of the Decade many institutions made effort to strengthen or institutionalize their capacity for developing their human resources. In 1988, thirteen countries reported having training programs. Also, in a few countries national training programs for the sector are being developed. However, the sector and its institutions have a limited capacity for identifying specific personnel needs, planning for the demand, and involving the educational sector in training.
- Sectoral planning is weak and incomplete in most of the countries, in part due to deficiencies in institutional organization, including the lack of appropriate planning mechanisms, as well as the lack of timely, adequate, and relevant information, necessary for the analysis and quantification of the problems so as to seek to effectively meet sectoral and institutional objectives. In the institutions it is considered that there is lack of criteria for planning and design, and difficulty in preparing projects that meet lending agency requirements. Institutionalization of the information and planning systems requires urgent attention.
- The lack of financing is considered one of the most important limitations in all the countries. Traditionally, in most of the countries investment in the sector has depended to a great extent on government allocations. In light of the economic crisis, subsidies will be more difficult to obtain, and have the drawback of establishing dependencies that interfere with the institutions' autonomy. It is

anticipated that major changes will be needed, including the development of financing systems adapted to the countries' respective situations. In this regard, the concept of recovering costs is winning acceptance, but the results are still limited.

- In the area of operation and maintenance, satisfactory schemes have yet to be put in place. Of 17 countries that reported on this topic as of late 1988, 14 considered this to be a serious limitation, and for three it was a moderate problem. Actually, operation and maintenance and the rehabilitation and optimization of installed capacity, as well as those aspects having to do with the provision of services, depend on effective management of the institutions. Therefore, operation and maintenance will have to be incorporated in the context of overall institutional objectives if there are to be results; this includes the concept of efficient use of water.
- The need for appropriate technology was recognized at the outset of the Decade as a means of cutting costs, simplifying operation and maintenance, and generally making the services more accessible to the communities. As of late 1988, 16 countries considered the lack of appropriate technology to be a limitation. Several countries have carried out research, and have adapted and improved the technology; but the applications have been limited. One of the main reasons is the failure to disseminate information; but in addition, it is necessary to develop the capacity for research, adaptation, testing, and application of technologies in the countries.
- Community participation including that of women, health education and linking to Primary Health Care is still limited. During the Decade some efforts have been made to incorporate them in the programs, some with success. Nevertheless, as of late 1988, 15 countries indicated lack of community participation. Also 18 countries reported insufficient health education, although a few had incorporated the subject in elementary school curricula and had taken other actions. The links with PHC have been limited. Although there is adequate sensitivity to the importance of these three elements, the incorporation in programs has been slow. After 1990 it will require comparatively greater efforts than in the past.
- A concern for deterioration of water resources is to be found in most of the countries, with some indicating that the situation is serious. In several cases, knowledge of water resources is incomplete. Although there is usually legislation on such resources, it is not strictly enforced. The current situation points to the need to adopt comprehensive policies for the management of water resources that include taking stock of the resource, and its preservation, recovery, use, and reuse.
- Cooperation among countries and among institutions has been fostered, or is in the process of being developed, in three sub-regions: Central America, the Caribbean, and the Andean area. The results have been positive, and it is hoped that the efforts will continue and that they are affirmed as mechanisms to support development of the sector. In addition there are good examples of country to country cooperation. Also, in some countries associations of water supply and sanitation companies have

been organized that may well yield major contributions in the future. The concern at the regional level has also increased, and the Interamerican Association of Sanitary Engineering and Environmental Sciences (AIDIS) has been strengthened. In addition the Latin American and Caribbean Association of Drinking Water Supply and Sewerage Companies (ALCEAPA) has been developed. Intersectoral cooperation has been obtained in some cases, but in most it is still incipient. Better organization of the sector would facilitate this process.

- International cooperation has been positive, having facilitated financial support and contributing valuable experience. Investment has increased in relation to the previous decade. However it did not reach the levels expected, contributing to the slow development of the sector. Future investments will have to be significantly larger.

**In conclusion, the countries of Latin America and the Caribbean have made advances in the Decade. However, these have been slower than expected and vary widely from country to country. The work that remains to be done by the year 2000 will require greater efforts, both from the countries and from the external support agencies, than those made from 1981 to 1988. In general three principal interrelated areas will require attention: Consolidating the achievements to date in terms of coverage and expanding this coverage to make up for the current deficit and the future population increase; improving water quality and the quality of services, the treatment and use of wastewater and controlling the pollution of bodies of water, as well as adopting comprehensive policies for the management of water resources; and finally optimizing the efficiency of the services and incorporating the principle of efficient use of water.**

In order to achieve these objectives it will be necessary to reaffirm the commitment, and change or modify the approaches and the strategies for action. In general, the principles enunciated by the United Nations Water Conference and the WHO/PAHO, which have only been incorporated to a limited extent thus far, will have to be applied more vigorously and effectively.

Each country, must make an analysis of its own situation and future prospects, based on adequate information, must define the problems with greater precision, as well as plan and implement actions necessary for correcting and controlling them. The advances of the Decade, having established firmer founding for progress than existed in 1980, make it possible to foresee a better future.

*SITUATION OF DRINKING WATER SUPPLY AND  
SANITATION IN THE REGION OF THE AMERICAS  
AT THE END OF THE DECADE 1981-1990  
AND PERSPECTIVES FOR THE FUTURE*

*I. INTRODUCTION*

In the 1960s and 1970s, the countries of Latin America and the Caribbean, pursuant to the objectives established by the Presidents of the Americas in the Charter of Punta del Este, Uruguay of 1961, and of the III Special Meeting of Ministers of Health of the Americas, Santiago, Chile, 1972, succeeded in significantly expanding water supply and sanitation services. The governments assigned higher priority to the sector, undertook institutional and legal reforms to create autonomous or semiautonomous institutions, and increased financing of the sector. The financial and technical support of international and bilateral agencies working in the sector contributed a great deal to these advances.

The United Nations Water Conference, Mar del Plata, Argentina, 1977<sup>1/</sup>, recommended that the period 1981-1990 be designated the *International Drinking Water Supply and Sanitation Decade (IDWSSD)*. The United Nations General Assembly welcomed the recommendation, and in a special session held November 10, 1980 officially launched the Decade.

The purpose of the Decade is in essence to fulfill Recommendation C.12 of HABITAT, the United Nations Conference on Human Settlements, Vancouver, 1976. This Conference called the world community's attention to the fact that: "In the less developed countries, nearly two-thirds of the population do not have reasonable access to safe and ample water supply, and an even greater proportion lack the means for hygienic waste disposal." It also proposed that: "Safe water supply and hygienic waste disposal should receive priority with a view to achieving measurable qualitative and quantitative targets serving all the population by a certain date; targets should be established by all nations and should be considered by the forthcoming United Nations Conference on Water."

The United Nations Water Conference, as expressed in its resolution II Plan of Action, placed priority on: "to provide all people with water of safe quality and adequate quantity and basic sanitary facilities by 1990, according priority to the poor less privileged and to water scarce areas."<sup>1/</sup> Thus, for the countries of Latin America and the Caribbean the IDWSSD represented a renewed commitment to and continuation of the efforts in which it was already engaged.

The Plan of Action prepared by the U.N. Water Conference for achieving the above-mentioned aim identified priority areas and recommended actions at the national level and involving international cooperation, including the establishment of goals for 1990 and the development of national plans and programs for drinking water supply and sanitation, in the context of the socioeconomic development plans. It also detailed other necessary initiatives.



The Pan American Health Organization/World Health Organization (PAHO/WHO), following the recommendations of their governing bodies and in their function as the international agency designated for monitoring the progress of the IDWSSD, has cooperated with the Member Countries in the efforts to attain the basic objectives of the Decade, in accordance with the goal of health for all by the year 2000. As a part of its responsibilities in providing support to the countries, the Organization has promoted national-level evaluations of the Decade. With this purpose in mind PAHO produced and distributed guidelines for the national evaluations and also supported their implementation. The specific objectives of the national-level evaluation of the Decade were:

- a) To analyze the status of the water supply and sanitation sector in relation to the situation in 1980 and the goals established by the country for the Decade.
- b) Based on advances to encourage the institutions in the sector and the country in general to plan development of the sector for the period after 1990, and to encourage the country to renew its political support.
- c) To provide an opportunity for the external support agencies (international, bilateral, nongovernmental, and others) to review their support programs.

The results of monitoring of the Decade and of the national evaluations have been consolidated in this document, which will be examined at the regional conference for evaluating the decade, which has been convened by PAHO, and is to be held in San Juan, Puerto Rico, September 4 to 6, 1990. This evaluation will constitute the Region of the Americas' contribution to the global evaluation of the Decade.

The consolidated document gives a regional and sub-regional overview on the advances of the Decade as well as of the limitations, and suggests orientations and possible actions for extending services to as many people as possible by the year 2000.

The information used, up to 1988, in the quantitative and qualitative analyses has primarily been from the countries of the Region that participate in the IDWSSD-PAHO/WHO monitoring system. This information has been supplemented by the results of evaluations of the IDWSSD done by the countries in 1990 (the executive summaries of the country evaluations are presented in Volume 2 of this document.) Also, reports of advisory meetings with external support agencies and data available from international and bilateral agencies have been used.

It should be noted that the conclusions of any analysis depend on the accuracy, integrity, reliability, and comparability of the information; and that there are limitations inherent to the data gathering and processing systems that affect the accuracy of the results. One of the major limitations in the Decade has been the lack of information systems on the different aspects of water supply and sanitation at the country level, including coverage data. Even though there have been improvements in this regard throughout the Decade, there are still deficiencies and discrepancies that must be corrected. Nonetheless, in regional terms the coverage figures in the report are considered to reflect reasonably what happened in the course of the IDWSSD, and what remains to be done, providing an acceptable vision of the magnitude of the problem and

implications for the future. There is a deeply-felt need to correct and improve the various information systems, such as statistics, management, finance and accounting, technology, and operations. However, it must be noted that the lack of information systems or their limitations are the result of institutional shortcomings, which need to be addressed so that the information systems may be operative components intrinsic to the sector's institutional system. This applies to a greater or lesser degree to all the countries of Latin America and the Caribbean.

## **II. THE REGION OF THE AMERICAS: ECONOMIC, DEMOGRAPHIC/SOCIAL AND ENVIRONMENTAL CONTEXT OF THE DECADE**

For the Pan American Health Organization/World Health Organization (PAHO/WHO), the Region of the Americas is made up of 35 Member Countries in North America, Latin America, and the Caribbean (Annex I). The actions of the Decade in the Region considered in this document cover the period 1981-1990 in the developing countries of Latin America and the Caribbean, and refer primarily to those countries that have provided information and carried out national evaluations.

The economic, political, demographic, and environmental situations are among the external factors that have influenced the development of the Decade and will significantly affect the sector in the future.

During the 1960s and continuing up to 1974, the economies of the countries of the Region were stable and developed. In 1975 the oil crisis slowed the process; this slowdown continued up to 1980. There is a general consensus that from the standpoint of many Latin American and Caribbean economies, the 1980s were "the lost decade"; conditions were exacerbated by the external debt, and the quality of life deteriorated. Even in 1989 economic growth in the Region continued to be sluggish, at 0.7%<sup>3/</sup>. According to the Inter-American Development Bank, gross domestic product (GDP) increased 12% in the decade; this economic growth was outstripped by population increase. As a result, per capita GDP declined 8 percent, returning to 1978 levels<sup>3/</sup>. Also, the external debt, which grew from US\$330 billions in 1982 to US\$441 billions in 1987, fell to US\$426 billions in 1988 and by 1989 was estimated at US\$434 billions and continues to represent a heavy burden to many countries. Inflation continues to have a serious impact on almost all the countries. Some are facing hyperinflation, with the resulting extreme increases in interest rates, smaller-scale investment, the reduction of real wages, increased unemployment and underemployment, as well as the growing proportion of the population under the poverty line.

Looking to the future, the IDB<sup>3/</sup> has concluded that "As the Latin American and Caribbean countries enter the 1990s, there is a growing consensus that concentrated efforts to improve the regions's competitiveness and export performance are a necessary condition for sustained overall growth." It considers in addition that "Without sustained expansion in investment output and employment, the deterioration in living conditions suffered by large segments of the region's population during the 1980s would continue in the decade ahead." In these circumstances increased investment by external and national sources in the sector above the levels reached in recent years of the Decade appears improbable; therefore it will be necessary

to optimize the use of existing resources and to find financing formulas that are adapted to the drastic economic and political changes, and which permit sustained development of water supply and sanitation services, with social responsibility. On the other hand, it must be stressed that the water supply and sanitation sector, in addition to yielding health and welfare benefits, is essential for the economic and social development of the people.

Rapid population growth, with an intense concentration in the urban areas, is an important consideration in relation to the provision of urban infrastructure in general, including water supply and sanitation.

Table 1 summarizes the population situation and dynamics of the Americas, in accordance with the estimates and projections of the Latin American Center of Demography (CELADE), by sub-regions and countries (Annex II). However, real growth has not always followed the estimates. In several countries there are substantial differences. The censuses that will be carried out in several countries in the early 1990s will provide additional and updated information on social, economic, demographic, and other aspects in the Region, thereby making it possible to affirm the bases for future projections.

**TABLE 1. The Americas: Estimated and Projected Total Population**

REGION AND SUB-REGION	POPULATION (IN MILLIONS)			POPULATION INCREASE (IN MILLIONS)	
	1980	1990	2000	1980-1990	1990-2000
The Americas	614.6	725.2	835.5	110.6	110.3
Latin America	352.9	438.0	527.7	85.1	89.7
Caribbean and Other Territories	9.9	11.4	13.0	1.5	1.6
North America	251.8	275.8	294.8	24.0	19.0

SOURCE: CELADE/PAHO. January 1990. Unpublished document.

In mid-1980 the population of the Americas was estimated at 615 millions, of which 363 millions corresponded to Latin America and the Caribbean. The projected population figures for 1990 are 725 millions and 449 millions, respectively. By the year 2000 it is expected to increase to 836 millions, with 541 millions in Latin America and the Caribbean.

For Latin America it is estimated that the population grew 85.1 millions in the 1980s, while it is expected to increase 89.7 millions in the 1990s. In the Caribbean these increases are calculated at 1.5 millions and 1.6 millions respectively, while for North America the estimates are only 24.0 millions and 19.0 millions for the same periods. Of the population increases, it is expected that most will be in the urban areas of Latin America (Table 2).

**TABLE 2. The Americas: Estimates of Urban and Rural Population**

REGION AND SUB-REGION	POPULATION IN MILLIONS			PERCENTAGE			INCREASE IN MILLIONS	
	1980	1990	2000	1980	1990	2000	1980-1990	1990-2000
<b>U R B A N</b>								
The Americas	421.9	521.7	626.1	69	72	75	99.8	104.4
Latin America	230.5	310.0	396.4	65	71	75	79.5	86.4
Caribbean and Other Territories	5.3	6.8	8.5	53	60	66	1.5	1.7
North America	186.1	204.9	221.2	74	74	75	18.8	16.3
<b>R U R A L</b>								
The Americas	192.7	203.5	209.4	31	28	25	10.8	5.9
Latin America	122.4	128.0	131.3	35	29	25	5.6	3.3
Caribbean and Other Territories	4.6	4.6	4.5	47	40	34	0	0.1
North America	65.7	70.9	73.6	26	26	25	5.2	2.7

SOURCE: Adapted from the Pan American Health Organization. Health Conditions in the Americas. 1990 edition (forthcoming).

According to Table 2, from 1980 to 1990 the anticipated increase in urban population in Latin America is 79.5 millions, with the percentage of urban population jumping from 65% to 71%, while the rural population is expected to grow by only 5.6 millions, with its percentage share declining from 35% to 29% of the total population. The urban population is expected to increase by 86.4 millions from 1990 to the year 2000, accounting for 75% of the total population, while the rural population is expected to rise 3.3 millions, accounting for 25% of the total. In the Caribbean the anticipated rise in the urban population is from 5.3 millions in 1980 to 6.8 millions in 1990 and to 8.5 millions by the year 2000 (for increases of 1.5 millions and 1.7 millions respectively for the two decades), while the rural population would remain constant or diminish slightly. The annual average growth rates of the urban and rural population, by sub-regions, are presented in Table 3.

**TABLE 3. The Americas: Annual Average Rate of Growth of the Urban and Rural Population**

REGION AND SUB-REGION	AVERAGE ANNUAL GROWTH (IN PERCENTAGES)			
	1950-1960	1970-1980	1985-1990	1990-2000
<b>U R B A N</b>				
The Americas	3.4	2.4	2.0	1.8
Latin America	4.5	3.7	2.8	2.5
Caribbean/Other Territories	2.5	2.4	2.5	2.2
North America	2.7	1.1	0.9	0.8
<b>R U R A L</b>				
The Americas	0.8	0.6	0.5	0.3
Latin America	1.3	0.4	0.4	0.3
Caribbean/Others Territories	1.1	-0.1	-0.1	-0.3
North America	-0.0	1.0	0.7	0.4

SOURCE: Taken from CELADE/PAHO, 1989. Unpublished document.

The increase in the urban population is particularly noteworthy in Latin America, with an estimated growth rate of 2.8% for 1985 to 1990. The annual increase from 1990 to the year 2000 is projected to be 2.5%, and is expected to happen primarily in marginal urban areas. In 1970 it had been estimated that on average 25% of the population lived in the urban marginal areas, in precarious conditions<sup>4/</sup>. Although there is no recent and thorough information, it is estimated that this situation continues to prevail, and may have worsened in the marginal areas of metropolises and larger cities, where according to a definition of low-income population the population in this category comprised 40% of the population of urban human settlements in 1981, in many cases possibly accounting for more than 60% of the urban population. Moreover, it has been calculated that from 1984 to 1995 the low-income population may increase by an additional 40 millions<sup>5/</sup>, overburdening the already inadequate water supply and sanitation services. However, there are significant differences among countries. On the one hand Honduras and Nicaragua have high average urban growth rates, 4.5% and 4.0%, followed by Bolivia and Guatemala with 3.8%, while Uruguay, Argentina, Cuba, and Chile have the lowest rates, i.e.

0.8%, 1.4%, 1.5%, and 1.7% respectively<sup>6/</sup>. In the Caribbean, including Puerto Rico, Suriname, and others, the urban growth rates, though smaller, are also high: 2.3% for 1985-90 and 2.2% for 1990-2000.

The concentration of population in the large cities and metropolises is especially significant, given their rapid growth, both in number and population (Annex III). In 1960 Latin America had five localities with two millions or more inhabitants; in 1970 there were seven; and by 1980 there were already 13 such localities, with a total population of 71.67 millions (31% of the urban population). In 1990 there are expected to be 14, with a total population of 99.68 millions (32% of the urban population), and by the year 2000, 22. It is estimated that by the year 2000 the 14 cities mentioned will have a combined population of 123.73 millions, to which will be added some 16 millions with the 8 additional cities, for a total of some 140 millions (34% of the urban population), including Mexico City with 24.44 millions, Sao Paulo with 23.60 millions, and Buenos Aires and Rio de Janeiro with 13 millions each. In Mexico, the three largest cities--Mexico City, Guadalajara, and Monterrey--are growing 4.5% annually. These data give an idea of the enormous quantities of water that are required and will be required in the future, and also of the volumes of wastewater that will be produced, which will require collection and treatment or disposal in an appropriate manner.

Of all the continents, South America has the largest quantity of water per inhabitant. In 1970 it was estimated that the flow of the rivers per inhabitant was 54,400 m<sup>3</sup>/year; but this ratio is rapidly changing due to population increase, and by the year 2000 it is expected to come to only 26,000 m<sup>3</sup> per inhabitant/year. Even so, by the year 2000, this would be 40% greater than Northern America, 80% greater than Africa and more than Europe and Asia<sup>7/</sup>. Although the water is not distributed uniformly and is not always found where it is needed, in general it is abundant and availability should largely not be a very serious problem. Unfortunately, environmental degradation, and particularly of water resources caused by pollution from major discharges of solid and liquid wastes produced by the population, as well as the products and wastes resulting from rapid industrial and agricultural development, are affecting the availability of water suitable for drinking water supply, crop irrigation, and aquatic products for human consumption, to such an extent that the authorities of several countries have expressed great concern.

This situation is making it necessary to increasingly use distant resources or resources requiring complex treatment processes, which makes the services less reliable and drives up economic and ecological costs to unimagined levels, especially in the metropolitan areas and larger cities, which need to transport large volumes of water over long distances. Other uses in the regions that are losing this natural resource are also being affected. One of the notable characteristics of the second half of the 20th century has been the emergence and rapid advance of water pollution in Latin America; this is a major problem, as it impacts not only on water supply and sanitation services, but also on the countries' social and economic development. The concern for water resources is not new in Latin America and several countries have institutions or water resource offices within natural resource or environmental agencies, whose purpose is to study and manage such resources. Also, several countries have approved special legislation for pollution control. Even so, the problems continue to mount with the development of conflicts

that suggest the need for comprehensive inter-sectoral policies for the recovery, conservation, use, and reuse of water resources.

The urgency of putting in place comprehensive policies for the management of water resources can be appreciated in the degradation of large volume rivers such as the Bogota, the Cauca, and the Magdalena in Colombia, the Mantaro in Peru, and those of the River Plate system in Argentina<sup>8/</sup>. In general the situation is worsening in some countries in relation to rivers and smaller bodies of surface water, as well as the groundwater, which is a major source of water supply for small and large communities, including metropolitan areas such as Mexico City, Lima, Santiago, and others.

### **III. EVOLUTION OF THE SECTOR IN THE DECADE 1981-1990**

This analysis of the sector in the Decade in the Region of the Americas is limited to Latin America and the Caribbean, and within these geographical areas it is based more specifically on the information provided by the 25 countries that participate in the IDWSSD-PAHO/WHO monitoring system. This information covers mostly 1980 and 1988, and is compared with the goals for 1990. These figures represent a more or less consistent data base for most of the countries, supplemented by the evaluations of the IDWSSD, which have been undertaken by 21 countries. Based on Table 1 and Annex IV, it has been estimated that in 1980 the total population of the 25 countries included accounted for approximately 94% of the total population, and that this proportion held more or less steady, and thus can be considered an adequate representation of Latin America and the Caribbean.

#### **3.1 National and Regional Goals**

Most countries of the Region established national goals for the Decade, taking into consideration the circumstances and conditions that prevailed in 1980, and attempting to approach, whenever possible, total coverage. In view of the social, political, and economic changes that have affected the Region in the course of the Decade, and with better information, some countries later made adjustments. The adjusted national goals proposed by the countries for 1990 are detailed in Annex V. For urban water supply these range from 56% to 100% with twenty-one countries indicating goals from 80% to 100%, three from 70% to 79%, and one less than 70%. For rural water supply, 12 countries proposed goals of over 60% coverage, and nine of less than 60% (three did not indicate goals.) In regard to urban sanitation services, 14 countries indicated goals of 80% coverage, four from 60% to 79%, and four less than 60%. In rural sanitation nine countries had goals of 60%, five from 40% to 59%, and ten under 40% (six did not indicate goals.) It should be noted that in several countries the established goals, while representing significant increases of population served, were not sufficient for maintaining 1980 coverage in percentage terms.

The country goals are reflected as follows as regional goals for Latin America and the Caribbean:

- To provide drinking water to 87% of the urban population, 80% through household connections and 7% through public sources that are reasonably accessible (within 200 meters of dwelling).
- To provide drinking water to 62% of the rural population through household or public connections with reasonable access.
- To provide sewerage or excreta disposal services to 79% of the urban population, 55% through household connections and 24% by other means.
- To provide sewerage or sanitary excreta disposal services to 37% of the rural population.

A general comparison of the goals for 1990 established initially in 1980, with the goals as adjusted during the Decade indicates the following:

	INITIALS GOALS	ADJUSTED GOALS	DIFFERENCE
URBAN WATER	91%	87%	- 4%
- Connexions	85%	80%	- 5%
- Easy Access	6%	7%	+ 1%
RURAL WATER	56%	62%	+ 6%
URBAN SANITATION	69%	79%	+ 10%
- Sewerage	-	55%	
- Other Means	-	24%	
RURAL SANITATION	31%	37%	+ 6%

The adjusted goals reflect greater coverage for urban sanitation and water supply and rural sanitation than the original goals. In contrast, the coverage goals for urban water supply services diminished from 91% to 87%, affecting the percentages of urban population served through household connections and reasonably accessible sources. The adjustments were due in part to the fact that Brazil, for example, did not set goals for urban water supply through public sources, urban sanitation with alternative solutions, rural water supply or sanitation, but did report coverages in both 1980 and 1988. And to present a more realistic picture of the regional situation, the analysis has assumed the coverage attained in Brazil by 1988 as goals, significantly increasing the figure for goals in the categories indicated. To a lesser extent, similar changes in countries with smaller populations also have contributed to the adjustment. Meeting the



adjusted goals would slightly diminish the imbalance that existed in early 1980 between water supply and sanitation in the original goals. The adjustments noted facilitate a regional overview, but may blur the developments in the specific countries and sub-regions. Thus chapter IV presents figures for the Central American, Andean, and Caribbean sub-regions. In addition, Volume 2 of this document includes the executive summaries of the national evaluations.

## **3.2 Cost of the Decade**

At the outset of the Decade, the countries of the Region, in addition to establishing national goals, determined unit costs of the new facilities, as part of the effort to install them. On the basis of those costs and the coverage goals it was estimated that such facilities would require some US\$30 billions, in 1983 prices, approximately US\$15 billions for water supply and US\$15 billions for sanitation. Of the total, 86% would go to the urban areas and the balance (14%) to the rural areas. Very few countries had information on operation and maintenance, investment in improvements, management, or support activities. In most cases these costs were not included in the estimate of the cost for the Decade.

There was no systematized information on the number of systems or projects in the countries. However, to get an idea of the order of magnitude of the sector and the task to be taken on, it is noted that from 1961 to December 30, 1984, a total of 5,550 water supply systems and 346 sewerage systems were built with IDB loans; and these are but a small fraction of the total number built. The Country External Support Information System (CESI), prepared by WHO has organized the information on projects, which is made available to the external support agencies for consideration of possible financing.

## **3.3 Improvements Attained**

### **3.3.1 Extension of Coverage and Service Levels**

The net increase in coverage and levels of service can be gleaned from Annexes IV and VI for the 25 countries, showing estimates of the difference between late 1980 and late 1988. Table 4 summarizes the regional situation and includes figures on the population served and not served, as well as the net reduction or increase of the population without service at the different levels.

**TABLE 4. Drinking Water Supply and Sanitation in Latin America and the Caribbean (25 countries)  
(Population in millions, 1980 and 1988)**

LEVEL OF SERVICE	1980				1988				1980-1988	
	POPULATION				POPULATION				INCREASE OF SERVED POPULATION	DECREASE/ INCREASE OF UN-SERVED POPULATION
	TOTAL	SERVED	% SERVED	NOT SERVED	TOTAL	SERVED	% SERVED	NOT SERVED		
URBAN WATER	223.5	183.0	82	40.5	291.6	257.8	88	33.8	74.8	-6.7
RURAL WATER	119.8	56.4	47	63.4	124.0	68.5	55	55.5	12.1	-7.9
URBAN SANITATION	223.5	174.2	78	49.3	291.6	234.7	80	56.9	60.5	+7.6
RURAL SANITATION	119.8	26.6	22	93.2	124.5	39.8	32	84.7	13.2	-8.5

DATA: Annexes IV and V

In the eight years of the Decade assessed, 87 millions additional people (75 millions in urban areas and 12 millions in rural areas) benefitted from drinking water services. In the same period an additional 74 millions (61 millions in urban areas and 13 millions in rural areas) received sewerage services or other sanitary solutions for excreta disposal.

In 1988 urban water supply services with household connections (Annex VI) reached 78% of the population; including the population served by public sources (access within 200 meters of dwelling), coverage came to 88% of the population, or one percentage point more than the revised goal of 87% for 1990. If this trend continues, it is possible that by 1990 the original goal of 91% coverage will be achieved, or almost achieved.

In 1988 urban sanitary sewerage services covered 48% of the population; if other methods of excreta disposal are included, coverage came to 80%, surpassing the adjusted goal of 79% for 1990 by one percentage point, and the original goal of 67% by 11 percentage points.

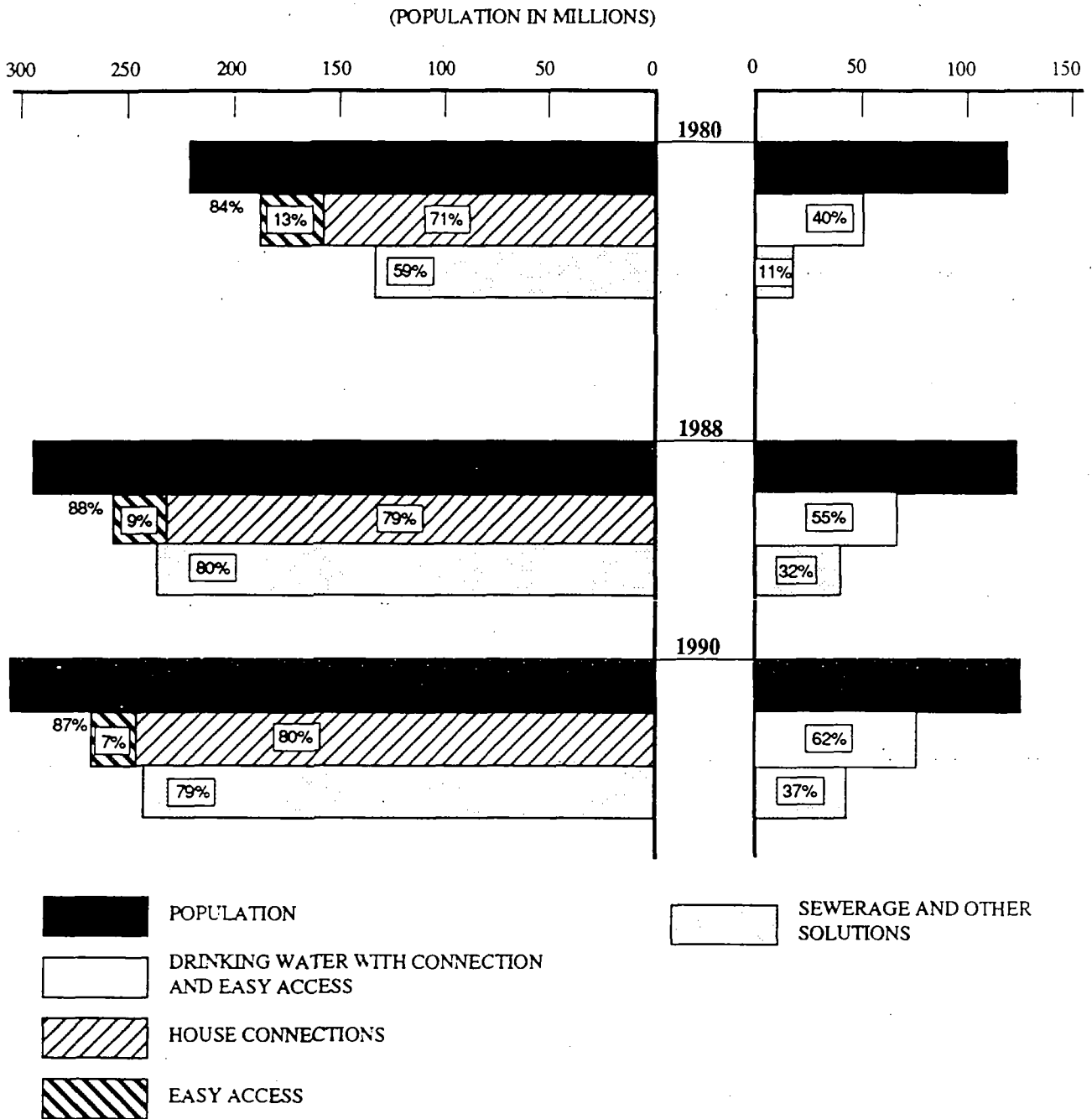
In 1980, 47% of the rural population had water through household connections or public standpipes. In 1988 coverage increased to 55%, or seven percentage points less than the proposed goal of 62%. If the trend seen in recent years persists, in the remaining two years one could expect an increase of another two points, i.e. coverage would reach 57%, five points below the goal.

Coverage of sanitary excreta disposal services in rural areas, as of late 1980, was 22% of the population; this figure rose to 32% by late 1988, or five percentage points less than the goal of 37%. In the two remaining years a further increase of two points can be expected, so that by the close of the Decade the actual situation would be three points below the goal.

The levels of coverage and services in the base year, 1980, and in 1988, and the goals for 1990, are summarized in Figure 1.

FIGURE 1

URBAN AND RURAL POPULATION WITH DRINKING WATER, SEWERAGE AND EXCRETA DISPOSAL SERVICES IN LATIN AMERICA AND THE CARIBBEAN 1980, 1988 AND REVISED TARGETS SET FOR 1990.



NOTE: The information on 1980 and 1990 provided by 25 countries has been updated with new data made available in 1983, 1985 and 1988.

The number of countries whose coverage by late 1988 was the same as or greater than the regional goals (Table 5) were as follows:

- Thirteen countries that together had an urban population of 167 millions reported coverage of water supply services of 87% or more, through household connections and public sources (Table 5a).
- Thirteen countries that together had an urban population of 189 millions indicated coverage of sewerage services and other means of excreta disposal of 79% or more (Table 5b).
- Ten countries that together had a rural population of 54 millions indicated coverage with water supply services of 62% or more (Table 5c).
- Twelve countries that together had a rural population of 58 millions reported coverage with sewerage services and alternative means of excreta disposal at 37% or more (Table 5d).

Table 5 also shows the number of countries by ranges of coverage, in percentage terms, as well as the total population of these countries and the population served.

The foregoing data show the progress made in eight years of the Decade in relation to the regional goals. However, it must be borne in mind that these averages are influenced to a great extent by the situation in the larger countries such as Brazil, which up to a point conceals the results of the efforts of the smaller countries. There were major differences among countries in initial coverage in 1980 (Annex IV), proposed goals for 1990 (Annex V), as well as the levels of coverage reached in 1988 (Annex VI). An assessment by sub-regions, presented in Chapter IV, makes it possible to look at what happened in the countries of the various sub-regions, whereas the country summaries, in Volume 2 of this document, provide details on each country.

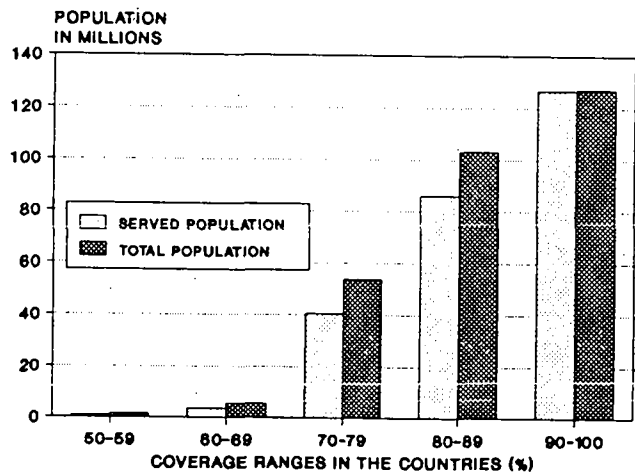
Notwithstanding the foregoing, it can be concluded that almost all the countries have increased coverage of urban water supply services, although in six countries (Colombia, the Dominican Republic, Ecuador, Guyana, Mexico, and Suriname) the coverage in 1988 was less in percentage terms than in 1980. On the other hand, five countries reported coverage equal to or greater than the national goals (Brazil, Chile, Nicaragua, Peru, and Uruguay). Also, several countries are near to reaching the goals, while others, despite having made considerable progress, are far from reaching them. In rural water supply, six countries report coverage equal to or greater than the national goals, and in three cases the coverage fell. The other countries have seen increases in coverage without attaining the goals. As for sewerage and alternative solutions for excreta disposal, seven countries reported coverage equal to or greater than the national goals, while four indicated reduction from the percentage coverage for 1980 (four other countries did not report.) In the urban areas eight countries reported coverage equal to or greater than the national goals, and seven indicated reductions in coverage in percentage terms. In rural sanitation, four countries indicated coverage greater than the national goals, while three noted that coverage was down from 1980.

**TABLE 5. Levels of Coverage with Water Supply, Sewerage and Excreta Disposal Services in Urban and Rural Areas as of late 1988 (25 Countries), (% Ranges)**

**URBAN AREAS**

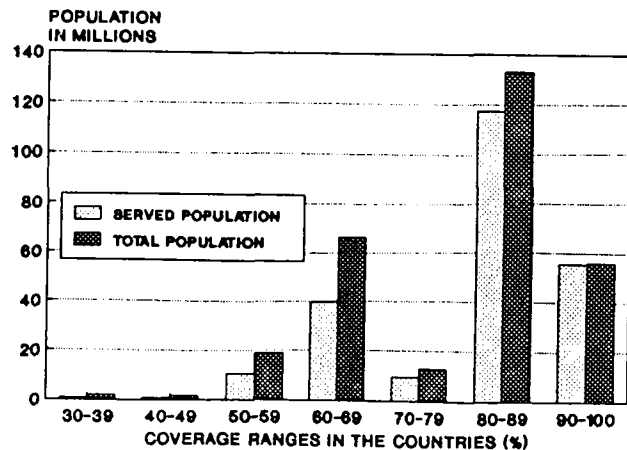
**a) Water Supply through House Connections or Public Standpipes**

COVERAGE %	COUNTRIES No.	TOTAL POPULATION MILLIONS	SERVED POPULATION MILLIONS
50-59	1	1.6	0.9
60-69	2	5.8	3.9
70-79	7	53.9	40.4
80-89	5	103.2	86.1
90-100	10	127.1	126.6
<b>TOTAL</b>	<b>25</b>	<b>291.6</b>	<b>257.9</b>
<b>87 or more</b>	<b>13</b>	<b>166.7</b>	<b>161.7</b>



**b) Sewerage and Excreta Disposal**

COVERAGE %	COUNTRIES No.	TOTAL POPULATION MILLIONS	SERVED POPULATION MILLIONS
30-39	1.*	2.1	0.7*
40-49	2	1.7	0.7*
50-59	3.*	19.1	10.5*
60-69	3.*	66.4	39.9*
70-79	3	12.9	9.6
80-89	6	133.3	117.6
90-100	7	56.1	55.6
<b>TOTAL</b>	<b>25</b>	<b>291.6</b>	<b>234.7</b>
<b>79 or more</b>	<b>13</b>	<b>89.4</b>	<b>173.2</b>

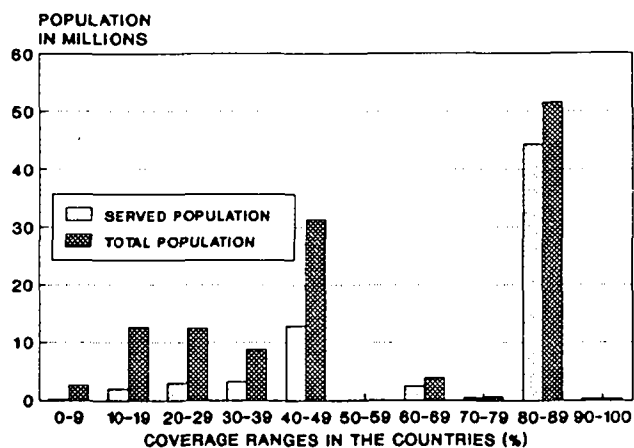


\* Incomplete Information

## RURAL AREAS

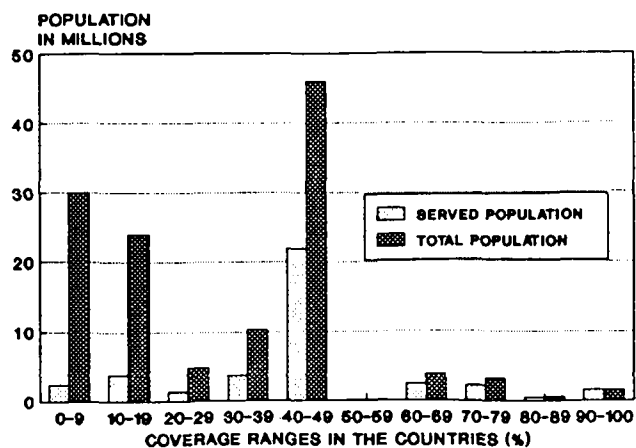
### c) Water Supply through House Connections and Public Standpipes

COVERAGE %	COUNTRIES No.	TOTAL POPULATION MILLIONS	SERVED POPULATION MILLIONS
0-9	2	2.6	0.2
10-19	4	12.6	1.9
20-29	3	12.4	3.0
30-39	2	8.7	3.2
40-49	2	31.4	12.8
50-59	1	0.1	0.1
60-69	2	3.8	2.4
70-79	2	0.6	0.4
80-89	5	51.6	44.4
90-100	2	0.3	0.3
<b>TOTAL</b>		<b>124.0</b>	<b>68.5</b>
<b>62 or more</b>	<b>10</b>	<b>53.7</b>	<b>46.0</b>



### d) Sewerage and Excreta Disposal

COVERAGE %	COUNTRIES No.	TOTAL POPULATION MILLIONS	SERVED POPULATION MILLIONS
0-9	5	30.0	2.4
10-19	4	24.0	3.8
20-29	1	4.9	1.4
30-39	4	10.3	3.7
40-49	3	46.0	22.0
50-59	0	0.0	0.0
60-69	4	3.8	2.4
70-79	1	3.2	2.2
80-89	1	0.5	0.4
90-100	2	1.5	1.5
<b>TOTAL</b>		<b>124.0</b>	<b>39.8</b>
<b>37 or more</b>	<b>12</b>	<b>58.0</b>	<b>28.5</b>



The situation attained by the different countries is a good basis for the planning that each country will have to do to accelerate the process in the future and to reach the coverage goals that may be proposed for the year 2000.

### 3.3.2 Deficits and Imbalances Among Services

Over the years there has been a considerable imbalance between drinking water and sanitation coverage, due in part to that fact in previous decades greater priority was placed on water supply than on sanitation. Table 4, in addition to coverage, shows the deficit in the services. In 1980, 30% of the population did not have household connections or access to public drinking water sources, and 42% did not have adequate sanitation services. Thus the imbalance between services was 12%. By late 1988, 89 millions people (34 millions in urban areas and 55 millions in rural areas, or 22% of the population) still had no access to water supply and 144 millions (58 millions in the urban areas and 86 millions in the rural areas, or 34% of the population) lacked adequate wastewater and excreta disposal services. As a result, in 1988 there were 55 millions more inhabitants with water supply services than with sewerage or alternative systems for excreta disposal (24 millions in the urban areas and 31 millions in the rural areas.) Thus, despite the significant reduction in the population without services, the imbalance continues proportionally similar to the one in 1980, and with a tendency to increase.

The deficits of and imbalance among services, like coverage, vary notably from country to country; to have a clear idea of these, the situation must be analyzed by sub-region and by country.

From the foregoing, it is concluded that there is still a major imbalance between the coverage of water supply services and those of wastewater and excreta disposal. In this context it must be emphasized that uncontrolled wastewater and excreta disposal is not only a major health hazard, but also has a significant social impact, since it directly influences the quality of life and affects human dignity, especially in the population of lower socioeconomic status. One of the basic concepts of the Decade is the complementarity of water supply and sanitation, strengthened by health education, which evidently has yet to be obtained throughout the region. Especially as regards the collection, disposal, and treatment of wastewater, policy considerations should not be based exclusively on cost/benefit analysis; in addition, special attention should also be paid to the social and health factors. Moreover, costs and damages to ecology and economic development must be taken into account.

### 3.3.3 Investments Made

Several countries report figures for investments made in the Decade that indicate that they were notably less than the totals proposed for meeting established goals. This has been due mainly to the impact of the external debt and inflation. Unfortunately, the information on national investment is insufficient for making an approximate determination of real investment levels. This has resulted not only from problems affecting the countries' information systems, but also from the major fluctuations in exchange rates and interest rates in many countries, which

make it difficult to estimate real investment. However, there is more specific information on the projects with external support, which gives an approximate idea of the level of investment.

The cooperation of the external support agencies working in the sector continues to constitute an important element in the sector's development. Several advisory meetings were held with the external support agencies working in the Region with a view to promoting and facilitating the investments and technical cooperation. These included: Caribbean sub-regional meeting (1983); regional meeting in Washington (1986); sub-regional meeting in Central America (1986); two meetings for Peru (1986 and 1990); and one for Bolivia (1987).

Annex VII shows the external financing provided by the World Bank and IDB (which, it is estimated, account for 90% of the external funds earmarked for the sector) as well as by some bilateral agencies and other agencies in the 1981-1989 period. Also shown are the national counterpart funds for loans. The accumulated loans from the IDB came to US\$2.408 billions, and those of the World Bank to nearly US\$2.000 billions in current values, for the ten years of the Decade. Private bank loans, donations and technical cooperation, support from bilateral agencies, nongovernmental agencies, volunteer programs and others are estimated to come to another US\$500 millions, taking the total of external investment to some US\$5 billions in the Decade. The counterpart funds come to some US\$4 billions, for a total of US\$9 billions in current values. On average, annual external investment in the 10 years was US\$500 millions, or approximately one-third of the total estimated at the outset of the Decade. The national funds, if one considers the overall ratio of 30% external to 70% national, should be more than double the external funds, including the counterpart funds. The limited information makes a specific regional estimate difficult.

### 3.3.4 Quality of Water and of the Services

The goals of the IDWSSD and of HFA/2000 mean more than simply building supply facilities and distribution networks that reach the communities. The goal of the Decade emphasizes providing water and sanitation with realistic standards of quality and quantity. From the point of view of health this implies providing safe water in adequate quantities, on a permanent, continuous basis (24 hours a day) to guarantee the quality, at a cost that the people can pay, as well as having sanitary services and installations for the disposal of excreta and wastewater. It should be noted that the coverage figures presented above do not necessarily represent services that meet the minimum standards of drinking water and sanitation.

Almost all the countries of the Region report having programs for the control of water quality in urban areas; most also report having such programs in rural areas. But in most cases these programs only are implemented in part, or are not implemented effectively, although there are notable exceptions. In those cases in which control measures are carried out, they are usually under the responsibility of the water supply institutions themselves; seldom have the health authorities incorporated surveillance as a major operational function of their work. In most cases, the programs are not committed to take action and have not allocated the financial resources, materials, and personnel duly trained for doing this work effectively.



Several countries of the Region have made efforts to improve water quality. For example, Argentina, Bolivia, Brazil, Colombia, Chile, Venezuela, and others have reviewed their national standards of water quality and have made other advances. Unfortunately, however, these have not been accompanied in all the cases by actions to improve water quality. As a result, water quality is still inadequate in a number of systems.

In almost all the countries, the programs for water supply appear to have focused on expanding or building new services, with less attention paid to the quality of water distributed. Access to a public source and even having a household connection do not guarantee the quality of the water supplied. Evidence of this is to be found in the results of surveys carried out by PAHO in the workshops organized to present and promote the new WHO Guidelines for Drinking Water Quality (1984) and later studies that indicated that 75% or more of the water supply systems did not provide or had serious operational problems that interfered with effective and continuous disinfection. A study in Mexico indicated that only 50% of the urban localities and 3% of rural localities disinfected their water supplies. In addition, in 1988 around 96 millions people regionally, 29% of the population served, had their water supplied through public sources, which does not in itself ensure the potableness of the water in the dwelling, even when the water is potable at the source<sup>10/</sup>.

In general, it is estimated that in the peripheral urban areas, where water services are intermittent, and in the small and medium systems, particularly in remote areas, the quality standards set by the countries are not met, and in general inefficient use is made of the water, with losses that may be as high as 60% of the water produced. Frequently, even the principal cities have intermittent services, at least in certain areas, with high levels of water losses. This is indicative of the impossibility of guaranteeing the integrity of the distribution systems and therefore of the quality of the water distributed to the population. Seventeen of the 25 countries indicate they have intermittent services; eleven of these consider the situation serious. Even countries with very high coverage, such as Costa Rica, report that they have some intermittent water supply services that do not meet the minimum standards of quality.

Ensuring the supply of adequate quality water both to those who already have services and to those who will receive new services poses one of the greatest challenges that most of the countries of the region will have to face in coming years.

### 3.3.5 Wastewater Disposal and Water Pollution

The existing information on wastewater treatment and facilities in Latin America and the Caribbean is limited. In 1962 it was estimated that in the countries best served only about 10% of the sewerage systems had treatment facilities<sup>11/</sup>. Currently it is estimated that the situation has not changed significantly in regional terms, although there are several countries that have made significant efforts in this respect. For example, in Greater Buenos Aires some 20 treatment plants have been built, and another 15 are under construction. However, in Argentina the wastewater of some six millions urban inhabitants is still discharged without treatment. Based on the coverage data (1988), and assuming an average of 200 l/p/d of wastewater for the population that has water connections and sewerage, 141 millions inhabitants would produce

326.4 m<sup>3</sup>/sec, of which only 16.3 m<sup>3</sup>/sec to 32.6 m<sup>3</sup>/sec is receiving some treatment. The urban inhabitants who have water in their residences without sewerage connections, at a rate of 50 l/h/d, would produce some 51.9 m<sup>3</sup>/sec more of wastewater. The total urban population, estimated at 291.6 millions, would produce 378.3 m<sup>3</sup>/sec of wastewater. It is important to note that these figures should only be considered indicators of the order of magnitude of current and projected demand for wastewater treatment, since other factors must also be considered, such as the possible increase in the population covered with sewerage services, industrial use, and other causes of increased discharges. The contribution of the urban population to the pollution of watercourses is summarized in Table 6.

**TABLE 6. Pollution Caused by Domestic Wastewater (1988)**

URBAN POPULATION	MILLIONS	CONTAMINATION OF WATER BODIES
<u>With sewerage and water</u>	142	
- Sewerage with complete or partial treatment (10% of the total)	14	Partial contamination depending on the extent of treatment
- Sewerage without treatment	128	Contamination from raw sewage
With house water connections, without sewerage	88	Partial and indirect contamination
With easy access to public sources without sewerage	27	Minor localized contamination
With no access to either public water sources or sewerage	34	Probably insignificant contamination

SOURCE: Annex VI

The discharge of untreated wastewater is a critical problem in all the countries, especially discharges originating in the metropolitan areas and large cities due to the large volumes they produce. Another important factor that contributes to the pollution of surface waters and groundwater is municipal solid waste, especially when disposed of with no controls, in open dumps or directly into bodies of water, and even "sanitary landfills" that are not well-designed, well-built, or operated properly. The contribution to water pollution by wastewater from smaller communities is also significant, since although such communities do not pose the macro-problems concentrated in the large cities, in their limited milieux they also cause damages to the

watercourses, including the groundwater, which is the source of water supply for both large and small communities.

The treatment of urban wastewater poses a major challenge both to decision maker and administrators and to the technical personnel in the countries, because of the related problems connected to natural resources, water supply, and other uses, the high cost of treatment facilities, and the lack of appropriate policies and technologies for the special characteristics and situations of the countries of the Region.

In relation to the foregoing, it is important to bear in mind that municipal wastewater is a valuable resource and plays an important part in the management of water resources. There is a considerable economic value attached to reusing such waters for irrigation, aquaculture, and other activities. However, the uncontrolled use of untreated wastewater for irrigation, which is reported by several countries of the Region, and for other uses, poses sanitary hazards, mainly due to the high content of pathogenic agents, and possibly toxic hazardous substances and heavy metals. A few countries have initiated actions in this respect, but in general the countries must adopt the necessary measures so that the practices of reuse are in accordance with appropriate sanitary standards.

The uncontrolled discharge of industrial wastes includes heavy metals such as mercury, cadmium, and lead, and an array of chemical substances, released into the watercourses, air, and soil, which eventually can reach food. Furthermore, as the demand for food increases due to population increase, there is a concomitant increase in the use of fertilizers, pesticides, and others agro-chemicals, which are frequently used without control, or with little concern for the potential effects and hazards for the population and water resources. The pollution of groundwater by nitrates and pesticides is of concern since groundwater is the source of supply for nearly 50% of the population of Latin America, and its contamination is difficult if not impossible to remedy. The increase in irrigated areas for food production also has negative effects, as the increase in the concentration of soil salinity diminishes productivity. In addition, deforestation causes erosion and soil loss, and diminishes the recharge potential of the aquifers.

Most of the countries of the Region regulate the discharge of industrial wastes, but enforcement of such regulations is limited; there are some critical situations of industrial pollution. In general it is estimated that few countries apply regulations fully and in many cases they do if only in the more notorious cases.

**In conclusion, the foregoing gives a clear idea as to the order of magnitude and the situation of the principal aspects of water supply and sanitation in the Region. Despite the efforts undertaken by the countries and the international support received, the problem has yet to be taken on fully such that in a relatively short period the existing deficits of coverage, quality, and quantity of the water supply and sanitary excreta disposal services could be eliminated and such services extended to those who need them most. In addition, the figures indicate that the situation in the peripheral urban areas is extremely critical and should be accorded priority in the coming years. It is necessary for both the authorities and the community to be involved in this effort.**

### 3.3.6 Impact on Health

Life expectancy at birth is one of the indicators most commonly used to characterize the health and well-being of a population. In general, life expectancy is increasing in the Region. But in many countries the figure is still very low as compared to the industrialized countries. The PAHO/WHO Plan of Action to achieve Health for All by the Year 2000 established the goal of life expectancy at birth of 70 years. For the 1975-1980 period the figure ranged from 48.6 to 73.5 years, and for the period 1985-1990 it is expected to vary from 53.1 to 74.9 years (Annex VIII), with 10 of 28 countries having a life expectancy of 70 or more years. The five countries with the lowest life expectancy in 1980 also had the lowest coverage of water and sanitation services.

Infant mortality and mortality in preschool children are considered to directly reflect the health situation and social development, and are closely related to the situation of health services. The World Health Organization has estimated that in the developing countries, 60% to 80% of all diseases can be attributed to deficient water supply and sanitation, and thus for the most part can be prevented.

Intestinal infections due to specific agents and ill-defined intestinal infections (including diseases such as giardiasis, gastroenteritis, diseases due to protozoa, and others) constitute a high percentage of the total, and mainly affect children. In the countries of Latin America and the Caribbean infant mortality is still high as compared to the industrialized nations. For 1980-1985 these figures were: North America, 12.0 per 1,000 live births; in Latin America, it varied from 41.8 per 1,000 to 69.7 per 1,000; and in the Caribbean, was 57.8 per 1,000<sup>12/</sup>. The Plan of Action to achieve Health for All by the Year 2000 proposes that no country have infant mortality greater than 30 deaths per 1,000 live births. According to the most recent information available in 1988, intestinal infections and ill-defined infections were the leading cause of death in the children under 1 year in two of the 23 countries and the second cause of death in nine other countries. In the 1-to-4 years age group, eleven countries pointed to them as the leading cause of death. This situation suggests shortcomings in water supply services and excreta and wastewater disposal, while also reflecting the lack of community and personal hygiene. This is confirmed by reports on increases in the number of cases of diarrhea, for example in situations of rationing of water, even in larger cities.

The relationship between water and sanitation and the diseases is actually much broader than indicated. Annex IX presents a partial list of the principal diseases related to deficient water supply and sanitation. Unfortunately, the epidemiological information on most of these diseases is very limited, although it is known that some are on the rise and need to be investigated in more detail. The recycling of wastewater for agricultural purposes without adequate sanitary standards is a major cause for concern. Preliminary information suggests that where this is practiced, the incidence of related diseases is high.

The statistics on water-borne diseases such as typhoid, hepatitis, and others is limited in the countries; even so, some with more reliable statistics report reductions of some such diseases and increases in others. The statistics need to be improved in order to have a more accurate idea of incidence and mortality.

Furthermore, the results of investigations done continue to determine the health benefits to be derived from water supply and sanitation services in curtailing diseases such as cholera, typhoid fever, diarrhea, and others. The results are usually positive when the interventions and research are done properly. Recent studies on reductions in morbidity from diarrhea attributable to improvements in water supply and excreta disposal services<sup>13/</sup> confirm the importance of these services, especially when they are accompanied by adequate health education and personal hygiene.

#### **IV. SUB-REGIONAL INITIATIVES**

In the Americas, certain groups of countries are recognized to share many characteristics. These include cultural and historical roots, geographical, geophysical, economic, and ethnic factors, and other important characteristics. These conditions also reflect the homogeneity of their problems and of certain approaches for attending to them. The Central American, Andean, and English-speaking Caribbean sub-regions all stand out in this regard, and this is recognized in the development processes in which they are engaged.

PAHO has considered the advisability of building on these conditions in order to promote horizontal cooperation among the countries of each Sub-region and optimize the resources from international cooperation so as to make a greater contribution to health. With this orientation, PAHO has supported the countries in the drawing up of "Health Initiatives" that are presently being implemented in these three sub-regions. This concept is now being considered for application to the countries of the Southern Cone.

Water supply and sanitation have been important components of the sub-regional initiatives. The initiatives have made it possible to define intercountry projects and to mobilize resources for improvements that benefit the participating countries. The Central American Initiative, the longest-standing, was launched in 1984 and to date there have been noted major advances. The Initiative of the English-speaking Caribbean countries dates from 1988 and now has in place mechanisms for supporting sub-regional action and thus actions taken by the countries. Finally, the Initiative of the Andean Countries was launched in 1990 and thus is in its initial stages. It is evident that these mechanisms for intercountry cooperation will give rise to a growing demand for health care and that they will play an important role in improving the sector in the future.

This chapter indicates pertinent aspects of the evaluation of water supply and sanitation in each sub-region.

##### **4.1 Central American Sub-region**

This sub-region is made up of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and the Dominican Republic.

The following table shows demographic data by country.

**DEMOGRAPHIC DATA ON THE COUNTRIES  
POPULATION IN THOUSANDS**

COUNTRY	TOTAL			URBAN			RURAL		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Belize	146	267	380	73	139	209	73	128	171
Costa Rica	2217	3016	3800	1200	1700	2090	1017	1316	1710
El Salvador	4529	5251	6739	1899	2468	3167	2630	2783	3572
Guatemala	7260	9197	12222	2690	3501	4669	4570	5696	7553
Honduras	3674	4880	7005	1319	2108	3530	2355	2772	3475
Nicaragua	2730	3937	5261	1460	2283	2893	1270	1654	2368
Panama	1920	2377	2893	945	1224	1533	975	1153	1360
Dominican Rep.	5431	7170	8621	2752	3728	4655	2679	3442	3966
<b>Total</b>	<b>27,907</b>	<b>36,095</b>	<b>46,921</b>	<b>12,338</b>	<b>17,151</b>	<b>22,746</b>	<b>15,569</b>	<b>18,944</b>	<b>24,175</b>

The population of these eight countries increased from 27.9 millions in 1980 to 34.1 millions in 1988, and it is estimated that it will reach 46.9 millions by the year 2000.

All the countries show a trend toward urbanization, but not as pronounced as in the rest of Latin America. In 1980, 45% of the population was urban. In 1988, 49% of the population was urban. The same percentage is anticipated for the year 2000. In El Salvador, Guatemala, and Honduras, the urban population is less than the rural. The least urbanized country is Guatemala, where only 38% of the population is urban. The most urbanized countries are Nicaragua and Costa Rica, where 58% and 56% of the population, respectively, is urban.

### **Water Supply and Sanitation Coverage**

The following table shows water and sanitation coverage throughout the Decade.

**POPULATION AND WATER AND SANITATION COVERAGE\*  
IN THE EIGHT COUNTRIES**

YEAR	POPULATION IN THOUSANDS			WATER COVERAGE %			SANITATION COVERAGE %		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
1980	27,907	12338	15569	55	85	33	42	55	32
1988	34,149	16650	17499	64	88	44	60	76	45
1990	36,095	17151	18944	74	88	60	70	78	60
2000	46,921	22746	24175	86	95	75	75	85	65

Four countries--Belize, Costa Rica, Panama, and Honduras--come to the close of the IDWSSD with total coverage of water supply at 75% to 95%. In these countries urban coverage is 90% to 100%, and rural coverage from 60% to 85%. It is expected that they will have 100% coverage by the year 2000.

Four countries--El Salvador, Guatemala, Nicaragua, and the Dominican Republic--come to the end of the IDWSSD with total water supply coverage ranging from 40% to 60%. In these countries the urban coverage is from 70% to 90%, and the rural coverage from 10% to 40%; it is expected that they will have an urban coverage of 100% by the year 2000. The rural coverage of the year 2000 is projected to be 50%, and total coverage in the countries, 75%.

Three countries--Belize, Costa Rica, and Panama--reach the end of the IDWSSD with total coverage of sanitation services of 75% to 95%. In these countries the urban coverage is 80% to 100%, and rural coverage 60% to 95%. It is expected that these countries will have a total coverage of 80% to 100% by the year 2000.

Five countries--El Salvador, Guatemala, Honduras, Nicaragua, and the Dominican Republic--reach the end of the IDWSSD with total coverage in sanitation services of 20% to 60%. In these countries the urban coverage is 30% to 85%, and the rural 15% to 50%; it is expected that they will have a total coverage of 50% to 70% by the year 2000.

The lack of uniformity in the information makes it difficult to give sub-regional data on water quality. Some countries classify quality as excellent, good, and bad, others as potable, safe, non-potable, or dangerous. However, in general one can say that there is more control of water quality for human consumption in the cities with population greater than 100,000. In the

---

\* Coverage indicates connection to a water supply or sewerage system, easy access to services, or individual facilities. The service is not always continuous and the water is not always potable.

smaller communities there is not much control. The general deterioration of the quality of water due to increased use of agricultural chemicals (fertilizers and pesticides), industrial discharges, and the lack of sanitary disposal of wastewater and solid wastes is cause for concern.

The increased coverage of sanitation services refers to collection of wastewater. There are no systematic statistics on treatment and sanitary disposal of wastewater.

All the countries are lagging in the area of sanitary disposal of wastewater. In the urban areas less than 4% of the wastewater is treated or disposed of acceptably.

There is an ongoing deterioration of water resources that makes it ever more difficult to guarantee the potability of water. Also, many agricultural products for human consumption are irrigated with waters whose concentration of bacteria exceeds the maximum concentrations recommended by the WHO guidelines.

### **Other Aspects**

Over the period considered there were important advances in institutional development at both the sub-regional and country levels. In the sub-regional area the Regional Coordinating Committee of Drinking Water and Sanitation Institutions of Central America (CAPRE) was established "with a view to discussing the policies and strategies required for improving the quality of drinking water services and establishing mechanisms of cooperation among the countries as well as strengthening relations of friendship and work"; and the first steps have been taken to obtain legal status for CAPRE. Nationally, the institutions responsible for water supply and sanitation were strengthened, as were mechanisms for coordination.

A project financed by GTZ, IDB, and PAHO that encompassed seven Member Countries of the CAPRE, was concluded. Within the activities carried out, the creation of permanent training systems in the institutions of the Member Countries and the development of training activities for non-professional personnel and mid-level managers, at both the sub-regional and country levels merit special mention.

The high rate of water loss is a concern for the water and sanitation companies. Thus the control of losses has been included as one of the principal activities in phase II of the CAPRE/GTZ/PAHO Agreement, which is to be initiated in the second semester of 1990. Controlling the losses and making efficient use of water is fundamental for being able to postpone investment, which is a priority in a time of economic crisis such as the present. Among the activities considered are the strengthening of operations and maintenance and of the marketing systems.

Population growth and urbanization are such that water as a resource is increasingly jeopardized in both quantity and quality. The deterioration of the quality of surface waters means that supply increasingly depends on groundwater; but it is a matter of concern that deforestation is also damaging to the groundwater as it diminishes recharge of the aquifers.



Disposal of wastewater and excreta in the soil (latrines and septic tanks) in densely populated areas is increasing the content of nitrates in groundwater and deteriorating its microbiological quality.

During the 1980s, as a result of the IDWSSD, the countries received support from international cooperation agencies. Of all these agencies, those deserving special recognition are the UNDP, UNICEF, and PAHO/WHO; USAID, CIDA, IDRC, SIDA, FINNIDA, and NORAD, Italy, Holland, Japan, Spain, France, Israel, and the United Kingdom.

Support has been received from nongovernmental agencies abroad such as CARE and the Clubs of Services.

The Inter-American Development Bank and the World Bank have played a particularly important role in financing the projects built in all countries of the sub-region.

The sub-regional projects have become a very important cooperation mechanism that has injected great dynamism into CAPRE. These include:

- The Central American Training Project (CATS) carried out from 1985 to 1990 with the support of GTZ, IDB, and PAHO, and implemented through CAPRE.
- Control of Losses from Drinking Water Supply Systems. This project, in its initial stage (1989-1990), has been developed with the support of the IDB, GTZ, PAHO, and CAPRE.
- Development and Protection of Water Resources. This project was initiated as an El Salvador country project sponsored by the UNDP. Subsequently the UNDP supported the countries in the preparation of a Program to Research Drinking Water Supply Sources in Central America. The final Program document has been concluded and implementation is pending external financing of US\$23 millions.
- Project for the Production and Marketing of Chemical Substances and other Inputs used in Water Treatment. The Finnish agency FINNIDA provided US\$60,000 to develop a plan of operations for this project, which is being undertaken by CAPRE and PAHO.

### **Future Prospects**

As of 1990, the projections of water coverage in the entire sub-region are 74% of the total population, 88% in urban areas, and 60% in rural. In sanitation coverage is 70% of the total population, 78% in the urban area and 60% in the rural. By the year 2000, and within the program to achieve Health for All by the Year 2000, coverage should be extended to 100% of the population. However, it has been considered more realistic to anticipate water supply services for 86% of the total population, 95% in urban areas and 75% in rural areas. In sanitation 78% coverage has been anticipated, 85% in urban areas and 65% in the rural areas.

To attain the proposed goals, the sub-region needs annual investments on the order of US\$400 millions. The current rate of investment is less than half this amount. The justification for these figures appears in the document "Status of the Priority Area of Water and Sanitation as of July 1990." Meeting of the Health Sector of Central America (RESSCA), 1990.

#### 4.2 Andean Sub-region

This sub-region is made up of Bolivia, Colombia, Ecuador, Peru, and Venezuela. In 1969 these countries (along with Chile, which withdrew in 1978) signed the sub-regional integration agreement known as the Cartagena Agreement, in order to promote balanced and harmonious development and economic integration. In 1971 the Ministers of Health of these countries, with a view to improving the health of the sub-region's population, signed an agreement named after Hipólito Unanue, a distinguished Peruvian physician.

In the 1980s, the sub-region suffered a severe deterioration of economic conditions that adversely affected all efforts to attain the goals established at the outset of the "Water Decade."

All the countries in this group saw significant increases in their populations, though in general the increases were not as great as anticipated when the Decade began. The following table summarizes the estimated populations in thousands of persons for 1980, 1990, and 2000.

#### POPULATION IN THOUSANDS

COUNTRY	1980	1990	2000
Bolivia	5.599	7.314	9.724
Colombia	25.000	31.819	39.397
Ecuador	8.123	10.782	13.319
Peru	16.812	22.332	27.952
Venezuela	15.024	19.735	24.715
TOTAL	70.558	91.983	115.107

SOURCE: Report on the Decade.  
CELADE (1990) United Nations 1989.

Sub-regionally, this represents a 30% increase of the population from 1980 to 1990 and an estimated increase of 26% (an additional 23 millions people) from 1990 to 2000. The bulk of the increase in the 1980s was in the marginal urban areas of the principal cities, due to both rural-urban migration and to higher birth rates; this same pattern is foreseen for the 1990s.

## Coverage

The advances in the coverage of water supply and sanitation services in the course of the Decade are summarized in the following table.

COUNTRY	Drinking Water Supply (%)				Coverage of Water Elimination Residuals and Excreta (%)			
	Urban		Rural		Urban		Rural	
	1980	1988	1980	1988	1980	1988	1980	1988
Bolivia	69	77	10	15	37	55	4	13
Colombia	100	88	79	87	100	85	4	18
Ecuador	79	75	20	37	73	75	17	34
Peru	68	78	18	22	57	55	1	17
Venezuela	93	89	64	89	91	97	90	70
SUB-REGION	87	84	43	52	82	78	15	25

In 1980, 87% of the 44 millions urban inhabitants had connections or easy access to water systems. This coverage declined to approximately 84% in 1988, although another 9 millions people received services. This reduction in percentage coverage was due to a 39% increase in the urban population, which to a great extent was due to migration from rural areas.

Over this same period the number of persons with household connections increased from approximately 25.4 millions to 35.1 millions; but average coverage remained at 57% owing to the large increase in the urban population.

In the rural areas the percentage coverage of drinking water services rose from approximately 43% to 52.6%; this reflected the relatively low growth rate of 6% of the rural population.

For the urban areas of the Andean sub-region coverage with household connections and excreta disposal facilities declined from 82% in 1980 to 78% in 1988; for the rural areas percentage coverage rose from 15% in 1980 to 25% in 1988.

The countries of the sub-region made an effort to treat the wastewater from the new services. However, as of 1990 less than 10% of the wastewater generated in the sub-region is being treated.

### **Drinking Water Quality**

All the Andean countries made efforts to improve the quality of their drinking water. Bolivia, Colombia, and Venezuela revised their national water quality standards. There was increased investment to expand water and sanitation services in all countries of the sub-region; but this did not include efforts appropriate for the circumstances to improve or maintain drinking water quality. Thus, water quality is inadequate in most water systems. There were also intermittent scarcities of chlorine in Bolivia, Colombia, Ecuador, and Venezuela due to problems associated with the importation of chlorine, which led to periods of deficient quality. In Peru, which generates a surplus of chlorine, the small towns frequently had no chlorination as a result of logistical and economic problems. The monitoring and surveillance of drinking water quality together with corrective follow-up measures is deficient in most towns and in the smallest population centers of the sub-region.

Many small water systems continue to use water supply from surface waters, with neither filtration or disinfection.

### **Other Achievements**

Several adjustments were made in the sub-region's water and health agencies; decentralization was a predominant trend in the larger countries.

### **Positive Aspects**

Improving and expanding water supply and sanitation services continues to be a priority need in all countries of the sub-region. All countries of the Region increased the total population that receives water and sanitation services. By the close of the decade there was greater interest in and a more concerted effort to serve the marginal urban areas as compared to 1980.

Efforts have been undertaken in the sub-region to strengthen institutional capacity. Most of the countries have decentralized their water supply and sanitation programs. All the countries have incorporated the development of appropriate technology in their programs for water supply and sanitation. This encompasses the treatment processes for making water potable, the treatment of wastewater, and excreta disposal.

### **Future Outlook and Recommendations**

Despite the extremely serious economic problems that face the Andean countries, there is still recognition of the importance of developing the water supply and sanitation sector as the key both to improving health and to promoting economic development. However, political support is still limited. A great deal remains to be done to reach the desired coverage and levels of services. The framework for achieving these goals is already in place, and simply needs to be strengthened and expanded so that the goals may become a reality. Recently the water supply

and sanitation institutions of the sub-region decided to coordinate their efforts and initiate the process of forming a sub-regional mechanism, the Andean Association of Drinking Water and Sewerage Companies and Institutions (ANDESAPA), which will be of great support in the future.

From May 9 to 11, 1990, representatives of the sub-region's institutions met in La Paz, Bolivia, to review the Decade in their own countries and in the sub-region as a whole, to analyze the current situation, and to prepare proposals for the future. The recommendations are directed to the governments, to sector and educational institutions and to professional associations. Special emphasis is placed on the suggestion that the national governments continue strengthening, and where necessary reorganizing, the water supply and sanitation sector, as well as the environmental health sector, clearly defining their respective responsibilities, so as to reduce duplication of efforts, eliminate jurisdictional conflicts, and simplify procedures; placing greater political priority on water supply, sanitation, and environmental health, reflected in political and financial support; promoting horizontal cooperation among the water supply, sanitation, and environmental health institutions at the sub-regional and country levels; and making it possible for the water supply and sanitation agencies of the countries to establish realistic rates and equitable rate structures, without unnecessary political interference so as to cover costs, and with entrepreneurial management so as to provide water supply and sanitation services adequately and efficiently, and in a manner that responds to users' needs; to facilitate external financing for projects and programs so as to accelerate the planning, design, construction, and operation and maintenance of the services provided by the sector; and, if necessary, establishing special financial systems for the sector, strengthen the national and international information systems, and in particular the collaborating centers of REPIDISCA.

It is recommended that the agencies and professional organizations improve the public image of the sector by using the mass media and improving the quality and reliability of services. In particular, they are urged to place special emphasis on providing information on the essential role of the water and sanitation sector in economic development, on greater private sector participation in appropriate areas of water supply and sanitation, and on promoting national and sub-regional programs for the professional development of engineers and scientists who work in the sector, with better integration among the universities, professional associations, and agencies.

It is also suggested that the national plans of the sector be updated with emphasis on providing services to marginal urban and rural areas, to municipal treatment of wastewater prior to discharge into bodies of water, to preserving the quality and quantity of water resources, and placing emphasis on the programs for control and preservation of water quality so as to comply with national standards or the WHO Guidelines for Drinking Water Quality.

Finally, it is recommended that special programs be developed, with sufficient financial resources, for the control of unaccounted water and to promote the efficient use of water, to promote and actively seek maximum community participation in the sector's projects and activities, to increase the research on appropriate technology to develop self-sufficiency, reduce costs, and improve services for all segments of the population.

### 4.3 Caribbean Region

The countries in the English speaking Caribbean associated with the Caribbean Community (CARICOM) had at the beginning of the decade a population of approximately five millions. Eighty six percent (86%) of the population live in five countries, Bahamas, Barbados, Guyana, Jamaica, and Trinidad and Tobago. The Eastern Caribbean countries consist of small islands with a median population of 100,000 (Antigua, Dominica, Grenada, St Kitts, St Lucia, and St Vincent). They share a common currency and are associated under the Organization of Eastern Caribbean Countries, (OECS). The less populated islands (Anguilla, British Virgin Islands, Montserrat, The Cayman Islands, The Turks and Caicos Islands) are dependant territories of less than 20,000 population each. Belize (146,000) located on the mainland of the South American continent is also associated with the English speaking Caribbean. Population figures for the Caribbean area are reported in Table 1.

**POPULATION CARIBBEAN COUNTRIES**

Countries	Population 1980 (1000)	Population 1990 (1000)
Anguilla	7	7
Antigua and Barbuda	78	85
Bahamas	208	241. *
Barbados	245	253. *
Belize	146	175. *
British Virgin Islands	11	13
Cayman	17	19
Dominica	73	81
Grenada	92	103
Guyana	758	755. *
Jamaica	2143	2480
Montserrat	12	13
St. Christopher-Nevis	45	45
Saint Lucia	118	136
St. Vincent and the Grenadines	114	120
Suriname	352	395. *
Trinidad and Tobago	1060	1320

\* 1988 Data

All countries in the region showed a moderate population increase during the decade with the exception of Guyana which experienced a decrease in population due to heavy migration of professionals and technicians overseas. The population of Jamaica and Trinidad were estimated at 2.5 millions (1988) and 1.2 millions (1988) with an annual growth of 1.1 and 1.5% over the

period 1980-88 respectively. The population distribution between urban and rural areas did not change noticeably however the trend toward urbanization and sub-urbanization continues particularly in the capital cities and secondary towns where several settlements in the outskirts lack basic infrastructure.

### **General Situation at the Beginning of the Decade**

Sector studies done by PAHO in the 1980-1981 and surveys carried out in preparation for the meeting in Jamaica on Project Preparation and Financing in 1983, indicated high water service coverage in terms of percent of population with access to pipe water, but overall poor quality of services.

The percent of population served by house-connection was considerably less than the total coverage (less than 50 percent on overall basis,) implying that a large number of people were receiving free services through standpipes. Water systems were found to be deficient in more than one way; among the most prevalent were the following: insufficient production, particularly in dry months due to depletion of surface reservoirs, intermittent supplies; insufficient treated water reservoirs, inadequate quality control and frequent breakdown of mechanical equipment.

Service coverage in sewerage was considerably less. Existing systems were built during colonial times about 50 years ago with sewerage extension constructed more recently in Trinidad, Barbados and Jamaica, mainly in response to crisis. Small systems have been built in most territories to serve hotels and tourist resort areas. The majority of urban population was served with septic tanks and latrines.

Water and sewerage management and operation were under semi-autonomous authorities in all countries (except St. Kitts). These authorities come under specific ministries of the government, mainly health, public works or public utilities. The autonomy of these agencies were very limited considering that they were all subsidized by Central Government. This practice has led to the development of very weak institutions regardless of the importance and size of the agency. The main constraints to sector development were identified as institutional weakness of the agencies due lack of financial autonomy and viability, inability of the countries to provide counterpart funding of local costs for projects, and, lack of adequate capacity for project implementation.

### **Achievement During Decade**

#### **Water Supply**

The water supply in the Caribbean continues to exhibit very high coverage levels, particularly in urban areas. An overall coverage superior of 97% was reported by Trinidad representing a 2% increase during the decade and 96.% in Jamaica (no % increase over 1980). The water situation in Guyana in general remained static even showing signs of deterioration as

this country experienced difficulties to maintain existing infrastructures due to economic constraints.

In the urban sector there was no significant increase in the coverage of population served with water. However, a change in the pattern of service level showing a trend toward increase in coverage through house connections compared to stand pipes was noticeable in several countries. Jamaica indicated an increase of 20% of the population served by house connections and Trinidad an increase of 16% over the decade while the situation in Guyana remained the same.

### COVERAGE IN WATER SUPPLY AND SANITATION EASTERN CARIBBEAN

Countries	Water Supply (%)		Sanitation (%)	
	1980 Population with access	1990 Population with access	1980 Population with access	1990 Population with access
Anguilla	-	90	-	96
Antigua & Barbuda	100	100	-	89
Dominica	85	85	56	75
Grenada	80	80	65	85
Montserrat	97	100	80	80
St. Christopher-Nevis	100	100	96	92
Saint Lucia	80	85	75	70
St. Vincent	65	90	90	93

### COVERAGE IN WATER SUPPLY AND SANITATION (%)

Countries	Urban Water		Rural Water		Urban Sanit.		Rural Sanit.	
	1980	1990	1980	1990	1980	1990	1980	1990
Barbados *	97	98			-	20		
**	3	2	78	99	47	27	16	-
Guyana *	85	92			29	32		
**	15	8	70	70	65	64	81	81
Jamaica *		52		63		21		13
**	-	47		27		79	13	55
Trinidad *	74	68			32	33		
**	26	27	84	90	68	67	98	92

\* House connections

\*\* Easy Access or individual systems



Coverage figures in water supply and sanitation for the Caribbean countries are reported in table 2 and 3. In the Eastern Caribbean, through the assistance of CIDA and the Caribbean development Banks several water supplies were improved in St Lucia, St Vincent, Dominica, St Kitts, Grenada increasing the availability of water and coverage in these islands. However in view of the prevailing high water coverage the figures have not substantially changed. Significant improvement was reported in St Vincent and the Grenadine, St Lucia, and Antigua. In St Vincent total daily water production increased by about 25% between 1981 and 1989. In St Lucia new raw water pumping stations has improved the reliability of water while in Antigua a water resource development and improvement has reduced the impact of periodic drought in this island. Barbados reported full coverage (98% household connection and 2% easy access) followed by St Kitts, Antigua.

Coverage of rural population served by water was increased in several countries notably Jamaica, Trinidad and the Eastern Caribbean. The rural population also benefitted from improvement in level of services. The highest coverage through house connection for rural areas was reported in Jamaica 62%. However services through standpipes remain the method of services for rural areas particularly in the eastern Caribbean resulting in considerable wastage of water.

Most of the water authorities are conscious to the need for water quality control and maintain laboratories with staff capable of carrying out routine water analysis. It is not infrequent that these analysis are not carried out on regular and systematic basis. The surveillance role of the ministries of Health has not always been evident. Several countries including Jamaica and Trinidad has attempted to develop appropriate water quality networks to overcome this deficiency.

### **Wastewater and excreta disposal**

While a considerable degree of progress has been achieved in water supply toward the achievement of the decade goals, the same does not apply to sewerage coverage. There was no spectacular achievement in terms of population served by sewage disposal as most countries thrive to maintain existing sewerage infrastructure. The pattern of coverage remains constant in urban areas, with the sewerage system servicing only the center of large urban areas. Sanitary sewerage systems were constructed or improved in Jamaica, Barbados, Grenada, Cayman Islands. Sewerage in Georgetown (Guyana) was also rehabilitated. The Bridgetown Sewerage Scheme (Barbados) which serves 33,000 residents and tourist population was completed in 1982. In Grenada a sewage pumping station and a new marine outfall were constructed as part of the improvement of the St George sewerage system. No major wastewater treatment facilities were constructed. In the absence of public sewerage systems and in order to keep up with new housing development and hotel development privately own package sewage treatment plants continue to proliferate. The pollution of coastal zones due to improper wastewater disposal remains a potential threat to the economy of the caribbean countries which rely heavily on tourism for development.

Notwithstanding The limitation in sewerage services, overall coverage in sanitation in urban and rural areas remains very high particularly through individual systems. Coverage above 80% is reported both in urban and rural areas in all countries. In the eastern caribbean, significant improvement is reported in sanitary means of excreta disposal in Grenada and Montserrat which increased their coverage to 85% and 92% respectively. However several areas of poor sanitation both in urban and rural areas remain the focus of transmission of diarrheal diseases particularly in Dominica where typhoid fever remains prevalent.

### **Other Achievements**

Several approaches to institutional improvement have been tried in the Caribbean during the decade with the objective of improving the technical and managerial capability of water agencies. Technical assistance in that respect include twinning with overseas water agencies, (St Lucia) assistance of consulting firms (Jamaica), technical assistance by international agencies (Trinidad and Guyana and Eastern Caribbean). With increasing financing constraints most countries took serious steps to meter their services. Administration of water was centralized in Jamaica under the National Water Commission and regionalized in Guyana. As of 1989 the responsibility for managing water supply in Dominica has been vested in a private company.

The Caribbean Basin Water Management Project financed by the Eastern Caribbean countries, CIDA and now managed by the Caribbean Development Bank constituted an important vehicle for human resources development and training during the decade through the organization of workshops, seminars, attachment and other training opportunities for staff of water utilities in the region.

The counties of the caribbean have benefitted from various sources of financing. CIDA has carried out an evaluation of their water programs in the Eastern Caribbean and proceeded to support water programs in Dominica (US\$4.6 millions) St Lucia in connection with the Roseau dam, jointly financed by the World Bank and the Caribbean Development Bank (total project US\$104 millions). In Grenada, St Vincent assistance has also been received from CIDA. The Caribbean Development Bank provided loans amounting to US\$47.7 to 10 Caribbean Countries the largest sums being granted to Bahamas (US\$16.7 millions) Cayman (US\$9.7 millions) St Lucia (US\$7.2 millions) Jamaica (US\$4 millions). Assistance has also been provided by USAID, BDD, the Inter-American Bank, and UNICEF.

As the Caribbean comprises large number of small islands with limited land capacity, the need for natural resources management particularly water resources and coastal areas became more apparent. These issues were addressed through three regional Projects: the Water Resources Assessment, Development, and Management in the small Caribbean Islands Project sponsored by UNDP, provided guidance to individual island in the Eastern Caribbean in water resources exploitation and management; the UNEP/CARICOM/PAHO project on Protection of Marine and Coastal Areas of Caribbean Islands provided the countries with an initial assessment of land based and coastal pollution in the region, and the project on Natural Resources Management funded by the Government of the Federal Republic of Germany is providing the

OECS countries with appropriate tools and training for management of water and their natural resources.

### **Positive Aspects of the Decade and Constraints**

The water and Sanitation sector in the Caribbean remains high priority for all governments in the Caribbean. This aspect has been crystalized in the Port of Spain Accord and the priorities established by the relevant authorities in the sub-regional initiatives of the Caribbean Cooperation in Health. However, with financial resources limitation the sector has become in close competition with other sectors of the economy and can no longer rely on government subsidies to finance and operate their systems.

The decade also became a rallying point for all countries and agencies in the Caribbean. Periodic meetings of several agencies involved in development of water and sanitation sector convened during the decade provided the opportunity for sharing of information in order to maximize benefit to the Caribbean territories. In addition activities such the evaluation carried out by CIDA of the water sector activities in the Caribbean (1982) and the conference on Project Development and Financing in the Water and Sanitation Sector in the Caribbean (1983) sponsored by PAHO yielded valuable information for sector improvement and to streamline water programs in the region.

### **Future Perspective**

The 18th Caribbean water engineers conference on water and sanitation in the Caribbean beyond 1990 which took place in Basseterre raised several concerns which need to be emphasized in the future. Of the utmost importance is the need for protection of water resources in the Caribbean through the formulation of better policies for protection of ground and surface water and water conservation. Waste water management also preoccupies policy makers and environmental managers in the Caribbean as coastal water and the beaches remain the main economic asset of the region. Future programs will need to seriously address this issue.

The improvement in the water sector during the period 1981- 1990 notwithstanding there are still needs to strengthen sector institutions so they become more financially viable to ensure proper management and sustainability of the services. Water quality programs also need to be made more effective. The formulation of adequate manpower policies and human resource development will continue to be a challenge for the sector in the pursuit of its objectives.

## **V. THE POST-DECADE**

### **5.1 Unsatisfied and Potential Demand for Services up to the Year 2000**

The first consideration in the period after the Decade will continue to be extending coverage of water supply and sanitation services that are adequate in quantity and quality to the

population without services and those poorly served. Table 7 illustrates the projected population to the year 2000 and the population served as of the end of 1988.

**TABLE 7. Unsatisfied and Potential demand for Services, 1988-2000, in Latin America and the Caribbean (25 Countries)<sup>1/</sup>**  
(Population in Millions)

SERVICE	POPULATION YEAR 2000 <sup>2/</sup>	SERVED POPULATION YEAR 1988	SERVICE DEMAND YEAR 2000
Urban Water Supply	380.6	257.7	122.9
Rural Water Supply	127.7	48.5	79.2
Urban Sanitation	380.6	233.2	147.4
Rural Sanitation	127.7	39.6	88.1

\* The population of the 25 countries for the year 2000 has been estimated assuming that it will be 94% of the total for the two sub-regions, in accordance with CELADE projections.

The difference between the population served in 1988 and the population projected for the year 2000 is the population that should receive services in the course of the 12-year period in order to achieve 100% coverage. The following are the figures: urban water, 122.9 million; rural water, 79.2 million; urban sanitation, 147.4 million; and rural sanitation, 88.1 million. These values, compared with the increases achieved from 1981 to 1988, are shown in Table 8.

**TABLE 8. Alternatives Goals for the 1990s and beyond.**  
(Population in millions)

SERVICE	Increase in Population Served 1981-1988	Increase in Population Served to Reach 100% Coverage by the Year 2000	Increase Required to Maintain % Coverage of 1988
Urban Water	74.7	122.9	91.9
Rural Water	12.1	79.2	3.7
Urban Sanitation	59.3	147.4	83.9
Rural Sanitation	13.0	88.1	0.3

In order to reach 100% coverage by the year 2000 the services will have to be expanded 1.6 times more in urban water supply, and 2.5 times more in urban sanitation, than the extension of coverages from 1981 to 1988. The demand for rural areas, though less, is also important; the scattered population constitutes a special challenge. In order to maintain the percentage coverage attained in 1988, it will be necessary to increase the urban water supply coverage by 91.9 millions (or 1.2 times more than the expansion since 1980), the rural water supply by 3.7 millions (0.3 times more), urban sanitation coverage by 83.9 millions (1.4 times more), and rural sanitation will require a small increase.

It is to be hoped that the decisions on coverage by the year 2000 are to provide safe water supply and sanitary excreta disposal to the entire population, or at least establish coverage levels so as to be between total coverage and diminishing the population without services.

In the next decade the greatest demand for water supply and sanitation services will be in the marginal urban areas, where 40% of the population, mostly poor, will reside. Even so, the rural population without services will still be numerous, including the scattered population, which will also require attention.

Meeting the coverage goals implies not only extending services to the entire population, but also providing safe water in sufficient quantity, on a permanent basis. This means that the services must be reliable, operate 24 hours a day, and use appropriate technologies that people can afford. In addition, excreta and wastewater disposal will have to be sanitary so as to not present health or environmental hazards.

To be able to provide water of adequate quality, it is necessary to impress upon the community in general and those responsible for the services in particular the importance of providing water of good quality to the community, both because of the health benefits and given the role of such services in economic and social development. In this process special attention must be given to community education and participation, and within this, to the role of women. In addition, it will be necessary to incorporate concepts such as the efficient use of water, which would imply strengthening the programs for surveillance and control, and ensure that close attention be paid to the quality of services. This includes controlling leaks, metering, enhancing operation and maintenance, and ensuring that supply and consumption are rationalized, reducing waste and poor use, fostering conscience as to the value of the services, developing a spirit of conservation, and applying technical standards to the materials and construction.

An important related aspect the countries will have to face decisively in the period after the Decade is the disposal of urban wastewater. This requires that the problem be identified and defined; that the policies for the treatment of municipal and industrial wastewaters be established or updated, taking into account the preservation and protection of water resources; that criteria and standards on the requirements for treatment be defined; that the institutional capacity be developed to apply controls; that treatment technologies adapted to the countries' conditions be identified, developed, and applied; that programs be planned and carried out; that criteria for the reuse of municipal and industrial wastewaters be adopted, in line defined with sanitary standards; and that other pertinent measures be implemented.

## **5.2 Restrictions and Limitations to be Overcome**

The plan of action for water supply and sanitation prepared by the United Nations Water Conference included specific activities, at the national and international levels, to facilitate the countries overcoming the restrictions and meeting the objectives of the IDWSSD)<sup>1/</sup>. WHO/PAHO, in consideration of the principles of primary health care, formulated the "Decade approach," which includes seven essential points for the planning and implementation of programs for water supply and sanitation<sup>14/</sup>. These are:

- the complementary nature of sanitation and water supply;
- orienting the policies and programs to the insufficiently served rural and urban population;
- achieving total coverage through programs that can be replicated, that are based on self-reliance and that can be maintained by themselves;
- using socially-oriented systems with appropriate technology;
- association of the community with the programs and projects at every stage;
- the close relationship between the programs for water supply and sanitation and those of other sectors;
- the association of the programs for water supply and sanitation with other health programs.

In addition, as the Decade progressed, the countries themselves and the international cooperation agencies proposed new concepts and ideas arising from the experience and difficulties encountered.

The countries of the region, on undertaking the national evaluations, analyzed the restrictions that had impeded greater progress in the Decade, and especially those that would have to be resolved to meet the goals of water supply and sanitation. As a part of this process they also examined the strategies and principles for the Decade and considered the degree to which they were put into practice, their validity, the need to change or modify them, and if necessary to seek new approaches that make implementation of the proposed work viable. The results of those analyses have been varied, both in emphasis and nature, depending on the degree of development of the services, the problems, and other conditions in the countries. Some of the most common principal aspects are addressed below.

### **5.2.1 Political Commitment and Priority of the Sector**

The United Nations Water Conference of 1977, in its Plan of Action, and the PAHO Directing Council of 1978, through the Strategies for Extending and Improving Water Supply

and Excreta Disposal Services in 1980s<sup>15/</sup>, appealed to the governments to place high priority on water supply and sanitation services. At the same time, it urged them to make decisions at the highest political levels and to include plans for the sector in the national development plans. The responses of the countries to these calls were varied and expressed in different forms; in general they were positive. Several countries, such as Chile, Brazil, and Costa Rica, reaffirmed the commitments that they already had taken on vis-à-vis their populations to significantly increase coverage. Among others, Ecuador and Argentina proposed or created sanitation funds, and several made the commitment at the highest political levels and obtained resolutions, passage of legislation, and other intangible instruments.

Twenty-five countries of the Region defined goals for 1990, 15 countries organized national action committees, and seven of these established technical support committees. Several countries, including Costa Rica, Chile, Brazil, El Salvador, and Guatemala already had national plans, and five--Bolivia, Haiti, Honduras, Paraguay, and Peru--prepared them with international cooperation from GTZ. Others did so with their own resources. Unfortunately, the initial momentum was not maintained, and many committees ceased to exist or operated on a sporadic basis. The plans that were prepared were not always implemented, and few countries incorporated them into national development plans. As the Decade draws to a close, several countries have reactivated or created groups to evaluate the experience, recognizing the importance of mechanisms for coordination and actions to be taken in the future. For example, in May 1990, the President of Mexico, having accorded high priority to the water issue, inaugurated the National Drinking Water and Sewerage Program, formulated by the National Water Commission.

Despite the initiatives undertaken in the Decade, and largely due to economic problems but also for other reasons, the countries did not obtain the recognition hoped for; thus most of the 1990 evaluations point to the limited priority placed on developing the sector, and the failure of the national water supply and sanitation plans to be included in the National Development Plans, as major limiting factors. On the other hand, the countries that have been successful in obtaining or maintaining high priority indicate that in order to win political support, it is important to have well-identified needs and to provide the authorities with a complete assessment so that they can establish realistic policies and objectives.

The foregoing suggests that it has not yet been universally accepted that water supply and sanitation are essential for guaranteeing the health and well-being of the people, in addition to constituting a condition for economic and social development; this means that greater efforts to foster awareness are required at all levels of society, including the technical, administrative, and political levels. Likewise, specific proposals for action are needed that consider the institutional, technical, financial, and other aspects. However, it should be emphasized that as a result of the process unleashed in the Decade, there is now much greater awareness of problems related to water supply than there was in 1980, which augurs positively for greater advances in the future.

## 5.2.2 Organization of the Sector and Institutional Development

At the beginning of the Decade, despite earlier efforts made in the area of institutional development, it was reaffirmed that many of the sector's institutions in the countries continued to suffer from a variety of limitations, and that several of the problems that they faced were due to inappropriate organization of the sector and the inefficiency of the institutions themselves. In several countries, this situation resulted in duplications and gaps in certain areas of responsibility, inefficient use of available resources, and difficulties coordinating with other institutions and sectors. In addition, little attention was given to the areas of planning, management, financing, marketing, operation and maintenance, and human resources as important institutional components.

In the course of the Decade, some of the countries have made efforts to improve the situation and achieved positive results. For example in Chile, the process of institutional development initiated in 1977 has continued. At present, with new rate structures and decentralization to regional companies that operate on a commercial basis, it is hoped that economic and financial self-reliance may be attained in the 1990s, with the possibility of eventually privatizing these companies. In Brazil the creation of the National Sanitation Plan (PLANASA), with the development of state companies in the 1970s, accompanied by a program for intense institutional development, gave great impetus to the development of services.

The decentralization of water supply and sanitation services, with a view to the decisions being taken at the level of the beneficiaries, giving rise to expectations of greater efficiency in operation and management of the services, has been a trend adopted by several countries; results have varied. In Argentina the process of decentralization began in 1980 was carried out rapidly. Several institutional and financial situations were encountered in the decentralized agencies that generated a gap of national competencies that were not covered at the local level, and which only in part continued to be served by the central level; this affected the sanitation system. Thus the entities adopted different organizational and operational modalities. At present, the government, with IDB and PAHO cooperation, is making efforts to improve the situation.

In Colombia, a process of political and administrative decentralization of the central government to the municipalities was legally established in 1986, to have the municipalities assume greater responsibility in the development of infrastructure, including water supply and sanitation. The process envisages the transfer of resources to municipalities of less than 100,000 population over a period of five years, and establishes other necessary adjustments and mechanisms. As a result, the sector is being totally reorganized within what is known as the "Plan for Adjustment of the Water and Basic Sanitation Sector," set forth within the Social Economy Plan, the campaign against absolute poverty, and the decentralization of public services. Decentralization processes are also underway, with their particular characteristics, in other countries of Latin America. In most, it will not be possible to assess the results of the decentralization processes until some years have passed. However, it is of interest to note that in some countries concern has been expressed over the possible impact of decentralization on the programs at the national level, which are also necessary for strengthening the sector.



Despite the progress made and in accordance with the concerns indicated, by the end of 1988, 15 countries considered that an important limitation to development of the sector has been the lack of defined governmental policies. Of these, at least six countries felt that this was a serious obstacle.

Actually, functions must be carried out at the central or national level and also at the local levels, which operate in an integrated and synchronized fashion so as to obtain the best possible results. In accordance with the special situation of each country, it will be necessary to define the central functions and those that should be decentralized. With total decentralization it is not easy to establish national priorities, standards, and information, and financial, training, and other systems. Most important is that the countries establish a national system of water supply and sanitation, including definitions of the most appropriate institutional arrangement for the sector and for coordination with other sectors at the various levels. This system should include the programming, control, and evaluation mechanisms that make possible the coordinated and integrated action of the institutions that are part of the sector. In addition, it should incorporate the definition and operationalization of the financial and other mechanisms that make possible permanent implementation of plans and programs, giving the necessary attention to the services' requirements and the productivity of the institutions. In the operational area, decentralization requires planning and programming, including of the instruments that facilitate the transition, without causing significant deterioration of the services.

### **Human Resources**

In almost all countries of the Region it is recognized that the lack of trained and updated personnel is an important limitation in the institutions of the sector, including at the managerial levels, which is more severe in some countries than others. This implies the need to train most of the personnel in the sector. At the outset of the Decade, based on the reports of the 24 countries, it was estimated that there were some 226,000 people employed in the sector, serving a population of around 240 millions (186 millions urban and 54 millions rural). If the same employee-user ratio is maintained, it was calculated that in the Decade some 2,100,000 training opportunities would be required. But in addition, it is necessary to take into account that the sector in general has little capacity to retain its personnel due to the low wages paid and other working conditions, such as the lack of a policy for developing personnel and the lack of opportunities for making a career in the sector. This results in high turnover of employees, requiring greater training efforts. In this context the frequent changes at the managerial levels and mid-level managers is an important problem. Also, the employee-user ratio varies among countries. For example, in Colombia it was estimated at 653 per million population with water service, not counting unspecialized workers, and around 2,700 per million in Suriname; this suggests that there are significant differences in the demand for training in the countries. As of late 1988, seventeen countries indicated that they had shortcomings in the training of professional personnel, and 18 pointed to deficiencies in the training of sub-professional personnel.

Perhaps the most notable progress in regard to human resources in the Decade has been the recognition that human resources are an essential and intrinsic component of the institutions; that the performance of an institution depends on the capacity of its personnel, their motivation,

and the availability of institutional resources that enable the staff to operate efficiently; and the idea that it is not efficient to train for training's sake, but rather to attain specific objectives and resolve shortcomings dependent on the personnel in the institutions. In other words, institutional development and human resources have to go hand-in-hand in order to get the best results. Within this context, managerial training should be accorded high priority, given the impact of managers on the effective and efficient operation of services, as has been noted in the various assessments and studies on institutional development done with the collaboration of PAHO over the years.

Furthermore, it is evident that the sector and its institutions still have a limited capacity to identify specific personnel needs, plan the demand, and involve the educational sector in training. There has been gradual recognition that developing human resources should not be limited exclusively to the institutions of the sector, but that the sector should also influence the basic academic training of professionals expected to work in the sector.

In the course of the Decade, the capacity for academic training, mainly in the area of sanitary and environmental engineering, increased significantly. In the Region there are currently 18 undergraduate programs; 28 post-graduate programs; 4 programs for specialization in sanitary engineering; and 2 for technologists in sanitation. These courses have, respectively, 870, 445, 80, and 45 places per year. This capacity is considered sufficient for meeting the future demands of the water and sanitation sector. However, and given the concern to make adequate use of this potential for training, closer coordination is required between the sanitation companies and the universities. Such coordination should result in a better definition of the profile of the professional so as to give direction to the educational processes.

Even though in the Decade many water and sanitation companies have made efforts to institutionalize their internal capacity to develop their own human resources as an integral part of institutional development, of 23 countries that reported on existing training programs in 1988, 13 indicated that they had training programs; but of 14 that had training budgets, only one considered this budget to be on par with needs. Several countries of the Region are in the process of developing national training programs. These include CENAGUA in Colombia, ANESAPA in Bolivia, SENAPA in Peru, SANAT in support of the National Sanitation Plan (PLANASA), which included the participation of the Brazilian Association of Sanitary Engineering and several specialized national and international agencies, and, the member countries of CAPRE.

### **5.2.3 Planning**

In 1978 and 1979, as part of planning the Decade, 17 countries prepared rapid assessments of the water supply and sanitation situation; 26 countries prepared data bases; and 11 prepared sectoral summaries.

Prior to 1980 several countries already had water supply and sewerage plans, which continued to evolve at varying rates. In Brazil the state-based approach of PLANASA was initiated in the 1970s, leading to the creation of revolving funds at the state level aimed at

self-sufficiency of the services. This approach continued in the period covered by the Decade, albeit with major institutional and structural changes. In addition, at the beginning of the Decade eight countries prepared national plans of different scope. In general, these plans were oriented more to the technical aspects of extending coverage, without adequate financial and institutional support. Of the plans prepared, not all have been incorporated into the national development plans; the national evaluations refer to the lack of planning as an important limitation. Nonetheless, they did have some successes. For example in Haiti the government formally adopted the sector plan and implemented the structures for promoting and coordinating the IDWSSD. The advisability of having national plans and programs was evidenced by the Decade evaluation. This exercise provided an opportunity to analyze the importance of establishing solid bases for more comprehensive sectoral planning in the future, including the institutional capacity needed for planning, implementing, and monitoring the sector plans and programs.

Of the 12 countries that reported on whether they had criteria for planning and design, six indicated serious limitations in this respect, and the other six classified this area as constituting a moderate limitation.

Several countries have made advances in project preparation but, as in the case of the sectoral plans, greater attention is still given to the engineering aspects and less to the financial, socioeconomic, and institutional analyses. Indeed, some countries consider that the lack of capacity to prepare projects in accordance with the requirements of the external support agencies has been a serious obstacle to obtaining loans.

The lack of pertinent, timely, and sufficient information that would make it possible to analyze and quantify the problems so as to seek effective attainment of the institution's objectives in the long, medium, and short term, and the lack of mechanisms for evaluation and feedback on the process, continue to constitute major limitations to planning. The implementation and operation of effective information systems, closely linked to institutional and sectoral operations, and the institutionalization of planning as such at the pertinent levels, needs to be done in almost all the countries of Latin America and the Caribbean.

#### **5.2.4 Financing**

The lack of financing is considered one of the most important limitations in almost all the countries, and if the approaches and policies are not changed it will continue to constitute one of the restrictions that will most affect the sector's development. Traditionally, in almost all the countries, investment has depended to a great extent on state allocations which, in light of the economic crisis in the countries, are more difficult to obtain. On the other hand, the practice of subsidies could prove disadvantageous for the institutions because it establishes dependency, which conceals the real costs and accentuates political interference in the institutions' autonomy. In essence, there is a need to develop financial mechanisms and systems that are adapted to the political and economic changes, so as to ensure the autonomous financial life of the institutions.

A concept that is proposed to ensure the financial viability of the institutions is recovery of costs. In this regard, the rates are the basic resource, and the institutions should be able to

establish them on the basis of efficient operations and adequate cost accounting to justify them. In order to meet this objective, policies and pricing structures will have to be developed that are in accordance with the situation of the poor population, or that permit recovery of costs without restricting access of the underprivileged to services. This will have to take into consideration that the population of the marginal urban areas normally has to purchase water from vendors at prices much higher than those paid in areas that have service.

### **5.2.5 Operation, Maintenance, Rehabilitation, and Optimization of Installed Capacity**

In the area of operation and maintenance of systems, in the past despite the efforts undertaken the desired results have not been obtained. Indeed, in several countries this problem has been identified as the most critical after financing, because of its impact on water quality and quality of the services, and the deteriorating effect on the installations. Of 17 countries that reported on operation and maintenance in 1988, 14 indicated serious or very serious limitations, and three, moderate limitations. Limited information on specific cases suggests that frequently new systems are interrupted or cease to function shortly after being installed, especially in small communities; this represents a loss of investment and credibility for the programs. More specifically, almost all the countries that carried out national evaluations noted water losses in the distribution networks ranging from 40% to 60%. Although this is considered a moderate limitation in several cases, in many instances the actual magnitude of the losses is not known. In addition, the vast majority of the countries state that they lack programs for optimizing installed capacity.

Studies done on operation and maintenance usually detect a lack of programs, actions, physical inventories, consumption data, data on the hydraulic operation of the installations, and data on operating costs.

Water losses in the supply systems, together with the inefficient use of water, or its use without consciousness of the need for conservation, have a negative impact on the companies' economy and impose unnecessary demands on water resources, deteriorating its quality with no benefit to anyone. These considerations are closely linked to the functions of operation and maintenance.

Rehabilitation and optimum utilization of the systems has also merited attention, albeit incipient, from the economic and institutional standpoints, as there could be significant savings deriving from better returns on investments made, by postponing plans for new expansion and investment, and by providing better services. Thus this area deserves high priority in plans for development of the sector.

The aforementioned situation is due in part to that fact that operation and maintenance have frequently been considered secondary functions, often detached from the institution's objectives. This has resulted in inadequate managerial control, and a lack of information to support the process. This is more evident in those critical systems that do not have clearly defined objectives, long-term planning, or short-term programming and budgeting processes. These systems are characterized by the lack of operational and managerial instruments for

programming, evaluation, and control of activities; restrictions in the quality and flow of information; the lack of manuals, catalogs, and censuses needed for orienting proper operation and maintenance of the systems, as well as for duly training the personnel; lack of coordination between the stages of project design, execution of works, and between their termination and implementation; limitations in preventive maintenance, often generated by the lack of clarity in weighing costs and benefits. PAHO has cooperated in the various fields with the member countries, both in the technical and operational aspects, and in the managerial aspects, for fostering comprehensive development of the institutions.

### 5.2.6 Technology

From the outset of the Decade it was considered that the traditional technologies from developed countries alone would not suffice to achieve the goals, considering the high costs they entail. Thus it was recommended that appropriate technology be developed and applied that is adapted to local conditions, with standards, processes and materials that make it possible to substantially reduce construction costs, are easier to operate and maintain, and use local materials and labor wherever possible. In 1988, 16 of 25 countries considered inappropriate technology to be a limitation. Of these, ten indicated that the problem was moderate, while six felt it was serious. In addition, almost all the countries agreed that financing is one of the most important limitations and that costs must be reduced. However, in only a few cases has the application of appropriate technology been related to possibly considerable reduction of costs.

Despite the foregoing, in the course of the Decade several countries researched and made use of appropriate technologies, while others have yet to initiate this process. Thus, for example in Brazil some 300 appropriate technology projects have been concluded or are underway in several institutions. This effort has been accompanied by broad dissemination of the results through several information agencies, including the Brazilian Catalog of Sanitary Engineering kept by the Brazilian Association of Sanitary Engineering. In Mexico important research has been conducted in several institutions on a variety of aspects relating to appropriate technology for water supply and disposal and treatment of wastewater and excreta, but the dissemination of information and application of appropriate technology has been limited, and the advances are still considered insufficient for the country's needs. Of special importance in Mexico has been the creation of the Mexican Institute of Water Technology (IMTA), in 1986; it is linked to the National Water Commission, which includes an appropriate technology component in its program. Efforts to foster technological development have also been carried out in Argentina, Bolivia, Colombia, and Peru, and on a smaller scale in other countries of the Region.

Among the topics researched, enhanced, or applied, the most significant include the following. Brazil is using simplified sewerage systems with a small diameter, different methods for disinfection, anaerobic upflow filters and slow upflow sand filters. In Mexico, there are domestic water filters, domestic equipment for removing arsenic, processes for desalination of water by reverse osmosis, toilets that consume little water, and technologies for controlling losses and making efficient use of water, among others. In Bolivia, in 1987 a Program for Research and Dissemination of Appropriate Technologies was launched that has investigated ceramic toilet

bowls with a hydraulic seal for latrines, solar water heaters, handpumps, and wastewater treatment using aquatic plants (reeds), among others. In Colombia and Peru horizontal and vertical gravel prefilters for slow sand filters, hypochlorinators with submerged orifices, and other devices have been researched. Windmills have been researched in Colombia, Peru, Argentina, the Dominican Republic, and Mexico; hydraulic rams in Brazil, Colombia, Mexico, and Peru; and latrines with improved hydraulic seals, in several countries. Slow sand filters have been investigated, modified, improved, and adopted in Brazil, Colombia, Cuba, and Peru. The use of a filtering geotextile screen between the sand and the biological layer of slow sand filters that triples the filtration rate has been field tested, and now its use is being promoted. Colombia has developed innovative water intakes for lakes and rivers that provide different degrees of treatment for waters taken in. COLILERT, a new method for analyzing the presence of total and fecal coliform in less than 24 hours from the time the sample is taken was introduced in Mexico, Honduras, and Peru, and is currently being field tested in the two first countries. In Mexico and Peru equipment to analyze water has been developed in collaboration with the University of Surrey, England/DELAGUA. A pilot project for the sanitary processing of refuse and wastes from latrines, for use in agriculture, was successfully completed in Haiti. Photovoltaic cells for pumping water have been utilized in Brazil, Colombia, Guyana, Haiti, Honduras, and Mexico. A new method for disinfecting water with a mix of oxidizing gasses generated *in situ* (MOGGOD) has been introduced in 14 countries; of these, Mexico, Cuba, and Argentina have developed and adapted the system for local use. It has been approved as an alternative method for disinfection in five countries. Peru, with cooperation from CEPIS, made strides in the design of stabilization ponds, whose effluents are used in agricultural irrigation and aquaculture. This technology has the potential to be used to address the problem of wastewater disposal in a variety of situations.

One of the factors that most limits extensive application of appropriate solutions is the scarcity of available information on technologies and actual experiences, including successes and difficulties. However, there are factors that affect application, such as the lack of understanding of the technological principles and details, resulting in inappropriate adaptations and applications; not having guaranteed the resources needed for field tests and medium-term applications so as to guarantee their continuous use, with the frequency and breadth required; the lack of experience in marketing products; and the lack of knowledge of the social implications that arise from the applications. In other words, there is a need to develop the national capacity for investigating, adapting, testing, and applying technologies. Although appropriate technologies are required for a variety of situations, an area in need of urgent attention is the development of appropriate technology for the collection, disposal, and treatment of wastewater, since the high cost and complexity of the conventional solutions, including household connections, stands in the way of greater progress in this field.

The Pan American Network for Information and Documentation on Sanitary Engineering and Environmental Sciences (REPIDISCA) has been strengthened and expanded. It currently has 238 cooperating centers in 19 countries; within REPIDISCA, special attention has been given to water supply and sanitation in support of the IDWSSD.

### 5.2.7 Community and Women's Participation

Community participation was included as an important Decade strategy for developing water supply and sanitation services, mainly in the rural areas. The experience of several countries worldwide has demonstrated categorically that community participation at all stages of the development and management of services is essential for ensuring operations and maintaining sustained services.

In some countries of Latin America community participation in water supply and rural sanitation services has been traditional, while in others it has been totally absent. However, in most of the countries this strategy has yet to be adopted as an essential component of the programs, even though all the countries recognize its importance. Thus, as of late 1988 at least 15 countries indicated that they lacked community participation, and only seven had incorporated women into important water supply and sanitation functions. One example of community participation is Colombia, which has nearly two decades of community participation in construction, operation, maintenance, and management. This program includes a revolving fund that provides financing. In Costa Rica community participation has been decisive in the construction, operation, maintenance, and management of the services. There, women's participation is currently fundamental at several stages, including analysis of the problem, definition of solutions, and at all stages of project implementation. In April 1990 the Women's Office was created in the Costarican Institute of Water Supply and Sewerage Systems (AyA), with a view to involving women in the process of fostering health, including drinking water and sanitation services. In Paraguay, by law the community participates from the inception of an idea, through the several stages of development of the projects, which are under the responsibility of the Boards of Sanitation, including operations, maintenance, and management; women participate at each stage. In Haiti community participation has been strengthened and has been made a requirement; thus women must sit on all local water supply and sanitation committees. Community participation in Haiti has been especially effective, and a unit has been established to promote community participation in the National Drinking Water Service. In some other countries the community administers the rural services and participates in some phases of the process.

Community participation in the urban areas has been limited or absent in almost all the countries. In only a few cases, such as Bolivia, are there cooperatives in which the community, including women, participates through the Management and Surveillance Council. In Bogota, Colombia, the Water and Sewerage Company, through the Division of Community Action, undertakes efforts to provide water and sewerage services that include participation of the marginal neighborhoods.

In general the promotion of community participation, and especially women's participation, requires new and greater efforts in most of the countries in order to realize the potential benefits of such participation.

### **5.2.8 Health Education**

From past experiences and during the IDWSSD it has been confirmed that one of the conditions for attaining the greatest health benefits from the provision of water supply and sanitation services is that such services be accompanied by adequate and pertinent health education.

As of late 1988, at least 18 countries of the Region reported that health education activities in general were insufficient, and eight of these considered this to be a serious shortcoming. Nine countries indicated that health education was taught in the schools; of these, five countries reported that the subject of health education is part of the normal curriculum. The type of activities as well as their intensity and frequency vary considerably among countries; in some, notable efforts have been made, while in others they have yet to be initiated.

In several cases the institutions responsible for water supply have taken innovative initiatives. For example, in Costa Rica all sanitation programs involve pertinent health education carried out through mechanisms established for this purpose. But in addition AyA has prepared curricula on environmental and sanitary education based on water, for use in the primary schools and high schools. Also, AyA has prepared a pilot program for primary and secondary school students on environmental protection and control of water pollution. In Guyana in 1988 the Guyana Agency for Health Sciences, Education, Environment, and Food Policies was created; it is hoped that with this step, special attention will be given to health education. The program for marginal urban areas of Haiti, organized by the Ministry of Social Relations with the support of the UNDP, UNICEF, GTZ, KfW, and nongovernmental agencies, is deserving of special mention. With this program, coverage of water services in urban areas increased from 51% to 55%. In Haiti rural water supply also increased notably, from 8% to 36%, and rural sanitation from 10% to 15%. In Panama 20% of the primary schools have programs for health education. In Paraguay the rural programs have a broad health education component within the community development programs. Also, primary and secondary school teachers receive training on specific topics including health aspects related to water and the environment. In several countries the water supply and sewerage companies, separately or in collaboration with local authorities and other institutions, have organized ad hoc campaigns and activities on related aspects. However, as has been indicated, the great majority of the countries consider that such efforts have been insufficient and that much still remains to be done.

### **5.2.9 Link to Primary Health Care (PHC)**

In relation to the integration of water supply and sanitation with primary health care, seven countries indicate that in the peripheral areas the projects are designed, planned, carried out, and integrated with other components of primary health care. Another six countries report that the activities are not coordinated. However, most of the countries consider that better coordination and integration are needed.

Among the countries that report coordination with health activities, El Salvador indicates that there is linkage in the rural programs with education, food and nutrition, maternal and child



health, and epidemiology. In Paraguay, primary health care and rural water supply are both under the Ministry of Health, and coordination takes place through the field staff. In Costa Rica there is no institutionalized coordination, but the Ministry of Health carries out the program for mini-water supplies and latrines that benefits the population with low health and social indicators. Also, the AyA utilizes information from the Ministry of Health to define priorities. In addition, a comprehensive project is being carried out jointly with the Ministry of Health and with external support, that includes water supply, excreta disposal, solid wastes, drainage, health education, and protection from contamination.

In general, even though there is awareness of the importance of integrating water supply and sanitation programs with primary health care, in practice this has occurred slowly, with only one-third of the countries having made efforts in this regard. The results are not yet definitive; but it is hoped that in the longer term there will be clearer indications of such progress.

#### **5.2.10 Status of the Hydraulic Resources**

Of the countries that reported in 1988, 15 expressed concern about the situation of water resources, and of these three considered that the situation was serious. In addition, 16 countries indicated that there was not complete knowledge of water resources, and four considered that the situation was critical.

In several countries pertinent legislation has been approved, which in some cases is extensive, and actions for prevention and control of pollution are carried out; but in most of cases these have not been sufficient. For example, in Brazil it is felt that the laws currently in effect, if enforced, would be sufficient to achieve the objectives. In El Salvador there is a Master Plan for Development and Utilization of Water Resources, and in late 1988 the Executive Committee to Protect Water Resources was established. El Salvador has also programmed research on water resources, with emphasis on groundwater, which should be initiated in 1991. In Colombia the Committee for Comprehensive Management of Watersheds was organized in 1983; other activities have also been carried out aimed at operationalizing this objective. In Costa Rica the concept has been adopted that a water supply system begins in the basin that recharges the source that supplies it, and therefore is an integral part of the basin. As a result, AyA has created a specific department for the protection, management, and improvement of basins, encouraging and achieving better intersectoral cooperation, which has also contributed to improving the Law on Water. In other countries actions have also been taken to improve existing legislation or to obtain appropriate legislation. However, the situation in several countries, as indicated, requires attention.

#### **5.2.11 Cooperation Among Countries and Institutions**

The most notable examples of cooperation among countries are in the sub-regions, especially Central America, where in the course of the Decade the CAPRE was consolidated, making it possible to establish procedures for cooperation among the countries, identify and share experiences, and obtain external and internal resources for undertaking sub-regional projects

geared to institutional strengthening, and which in turn consider individual shortcomings or limitations. One of the activities that has been solidified under the umbrella of CAPRE is a project for non-professional and mid-level manpower training, focusing efforts on controlling losses. This area has been identified as a problem common to the institutions that make up CAPRE, and for which common solutions can be found. The formation of ANDESAPA is another example of cooperation among water supply and sanitation agencies at the sub-regional level.

Yet another case of cooperation among countries has been the Project for the Caribbean Basin Water Management, which at the outset of the IDWSSD was placed under the management of the Caribbean Development Bank. This project, in addition to stepping up the training processes, has become a forum for discussing problems and a mechanism for direct cooperation among the countries' institutions.

During the Decade activities involving horizontal cooperation among the institutions of several countries have also been carried out. For example, the Minas Gerais Sanitation Company (COPASA) and the Parana Sanitation Company (SANEPAR), both of Brazil, have cooperated in the institutional and technical development of provincial companies in Argentina. Also, SANEPAR has signed an agreement with the State Sanitary Works office of the Government of Uruguay. The Basic Sanitation Company of Sao Paulo, Brazil, has cooperated with the Federal District of Mexico in controlling losses and other aspects of the operational area, and with the city of Bogotá in controlling losses. The city of Guayaquil, Ecuador has received cooperation from Dade County, Florida, United States. Paraguay is negotiating an agreement for technical assistance, generation and transfer of technology, and institutional, technological, and operational development with SANEPAR.

Some countries have created mechanisms that establish relations for exchange of experiences, discussion of common problems, and cooperation among water supply and sewerage institutions at the national level, such as ANESAPA in Bolivia and ANOAPA in Mexico.

At the regional level the Inter-American Association of Sanitary Engineering and Environmental Sciences (AIDIS) has been strengthened and has improved its organization so as to fulfill its objectives of promoting the development of environmental health. The Latin American and Caribbean Association of Drinking Water and Sewerage Agencies (ALCEAPA), which was initiated in Montevideo in 1986, is an international forum that contributes to the exchange of ideas and experiences among the companies that provide water supply and basic sanitation services.

Intersectoral coordination has been considered essential for ensuring more efficient performance and development of the sector. This implies defining and establishing the mechanisms for coordination and cooperation with the institutions of other sectors that affect or relate to water supply and sanitation, such as health, environment, water resources, planning, public works, agriculture, industry, economy, and finance, as well as with external support agencies, depending on the situation of each country. Intersectoral coordination and cooperation is particularly important and urgent in areas related to the management of water resources and also in relation to urban planning and development in general. Some examples have been

mentioned, but few countries appear to have developed effective operational mechanisms for achieving the necessary coordination and actually carried out such coordination. The earlier mentioned organization of the sector must also include the definition of the institutions and mechanisms for coordination so as to obtain the best possible results.

#### **5.2.12 External Cooperation**

The plan of action for the Decade includes specific recommendations for governments action with international cooperation and in order to extend the coverage of drinking water supply and sanitation services. The external support agencies organized to provide such collaboration, and have rendered it in different forms, including direct support to the countries and through the coordinating groups, promoting investment and technical cooperation.

Several meetings of consultation have been held in the Region on mobilization of resources, at the regional and intercountry levels, and in some countries with the support and active participation of international and bilateral cooperation agencies. Annex VII shows the financial cooperation received from some of them. In addition, in the course of the Decade and as a result of the experiences of the external support agencies, new concepts have been incorporated and some approaches have been modified, priority areas of action have been identified with international cooperation, and other orientations have been given to promote the work of the Decade at the national level. In general, the international cooperation agencies support the work in the period after the Decade, and believe that the momentum developed should be maintained so as to achieve the proposed goals.

### **VI. CONCLUSIONS**

- 6.1 In Latin America and the Caribbean the IDWSSD has evolved in a context of political, social, environmental, and economic changes that have affected the results. Although these changes have had a varied impact in the different countries, in general the economic crisis and environmental degradation have had a negative effect on all of them, driving down the quality of life in populations.
- 6.2 Population growth has generally stayed within projections, although in some countries it has been less than expected. Meanwhile, the growth of the urban areas in some countries has been accelerated, due to migrations of the rural population, for the most part poor, to the urban areas, thereby increasing the population in the marginal areas. This trend is expected to continue with similar intensity in the near future.
- 6.3 All the countries of Latin America and the Caribbean have made advances in extending the coverage of water supply, sanitary sewerage, and excreta disposal services in the eight years of the IDWSSD up to 1988; it is expected that by the end of the Decade the regional goals, estimated on the basis of the national goals, will have been met by and large. However, progress has not been uniform, and there are major differences among the countries in the coverage achieved. Some countries have not succeeded in

maintaining the levels of coverage, in percentage terms, that they had at the end of 1980, while others have made substantial improvements.

- 6.4 The proportion of urban and rural population that has inadequate services or no services whatsoever is considerable. Greater shortcomings are found mainly in the marginal urban areas of the larger cities and metropolitan areas. The rural areas, though growing slowly, have a large proportion of population that requires attention, including the scattered population, which is still numerous and poses a special challenge.
- 6.5 The principal achievements of the Decade have been in the construction and extension of the physical works, and to a lesser degree in the quality of water delivered to the consumer, which also implies improving service. A considerable proportion of the water supply services are intermittent and many do not regularly disinfect the water.
- 6.6 Even though the disparity among the water supply and sanitation service has been diminished somewhat in the Decade, there is still a significant imbalance due to the lack of sanitation in marginal urban areas and in rural areas. This means that sanitation should receive greater attention in the future.
- 6.7 In general there is inefficiency in the use of water. The concept of efficient use of water requires that the surveillance programs be strengthened and that the quality of services be addressed, including the control of water losses, metering, operation and maintenance, rationalization of the allocations; that wastes and poor use be reduced; that awareness be developed as to the value of the services; and that a spirit of preservation, which has yet to be widely adopted and applied, be fostered.
- 6.8 The forecasts of population growth for the period after the Decade indicate that the increase will continue at a considerable pace, and that for the most part it will be accounted for by people with scarce resources who will locate primarily in urban peripheral areas, especially in the large cities. Thus such areas should receive high priority in the planning of programs for extending services. The rural populations are also growing, albeit at a slower pace, in most of the countries. However, the current deficit is large and should be reduced.
- 6.9 The control of drinking water quality is generally inadequate, in part due to the lack of technical, human, and material resources, and also because of the lack of a sanitary consciousness. This activity should be accorded priority in the period after the Decade, both because of its importance for health, and in view of the role that it plays in economic and social development. The health authorities, water supply and sanitation companies, and those in charge of water resources need to pay more attention to the surveillance and control of water quality, as well as to the adoption of comprehensive policies for the management of water resources, including their protection, preservation, use, and reuse.
- 6.10 The treatment of municipal wastewater, almost nonexistent at present, will be one of the greatest challenges--political, administrative, and technical--in the period after the

Decade, given the consequent degradation of water resources when rivers, lakes, coastal waters, and groundwater are contaminated, sometimes causing irreparable damages that jeopardize the various uses of water, and also due to the high cost of existing technologies and the need to formulate policies and develop technologies appropriate for the conditions and characteristics of the countries.

- 6.11 The reuse of municipal wastewater has an important economic value; reuse can contribute to diminishing the impact of contaminated waters on natural resources and the ecology, but requires the observance of adequate standards in order to prevent health and ecological hazards.
- 6.12 The efforts to incorporate community participation and health education in water supply and sanitation programs as well as linking them to Primary Health Care in an opportune, continuous and permanent fashion have been limited and need to be intensified in almost all countries.
- 6.13 Cooperation among countries, especially at the sub-regional level has demonstrated to be a viable mechanism, but it is necessary to maintain the interest and to continue efforts to strengthen it. Cooperation from country to country also needs to be expanded. At the same time intersectoral cooperation needs to develop mechanisms for action.
- 6.14 External cooperation has been invaluable and will continue to be needed. In view of future demands it is desirable that it be expanded in line with the capacity that the countries can develop to absorb it.
- 6.15 An important accomplishment of the Decade has been the development, in the managers of water supply and sanitation services, and to a lesser degree in the political levels, of a greater sensibility toward the need for substantial changes in policies and in the way to conduct the business of the sector in the future.

## **VII. THE POST-DECADE CHALLENGES**

It is perceived that after 1990 the countries of the Region will have to consider three priority interrelated aspects to attend to present deficiencies and future demands:

The first consideration will continue to be the extension of water supply adequate in quality and quantity, accompanied by sanitary excreta disposal services to cover the urban and rural dwellers that do not have them or are poorly served, in accordance with the objectives of the IDWSSD and Health for All by the Year 2000.

In second place, together with the extension of coverage they will have to consider the need to improve the quality of water distributed to the community so as to ensure compliance with the countries minimum standards, including effective surveillance and control mechanisms, as well as attending to wastewater treatment and other wastes disposal within the context of pollution control of chemical toxic contamination, all related to the development of policies for

the integrated management of hydraulic resources, including their preservation, recuperation, use, and reuse.

In third place the countries will have to give special attention to the optimization of the services and the efficient use of water, which implies the regularization of consumption to avoid wastage, the reduction of water losses, the development of a reuse and conservation of water through education and the active participation of the community.

In light of the economic and financial limitations the countries face, the abovementioned objectives require that concepts, approaches, and strategies to promote this process be adopted and applied, such as the provision of adequate and economical services, albeit limited, that can be gradually improved as the economic conditions of the communities change; the development of financial mechanisms that facilitate the channeling of funds (such as revolving funds) for building works; the recovery of costs, guaranteeing the financial life of the institutions; and others.

In general progress has been made in applying the strategies and principles of the Plan of Action of the United Nations Water Conference and of WHO; however, progress has been slow and limited, and for the most part these strategies and principles are still pertinent, though some require adjustments and modifications. Nonetheless, there are enough successes that justify insisting on wider application. Also, as a result of the experiences of the Decade, other principles and strategies have been identified that should be incorporated. Each country will have to review its specific situation and adopt or develop its own strategies and approaches for the future.

Among the principal actions needed to achieve the proposed objective are:

- The need to renew and strengthen the political commitment, including the resources necessary for the operationalization of this political will.
- Seeking adequate organization of the sector in the countries, at the different national levels, as a means for obtaining the institutional infrastructure most adequate for developing the sector, taking into account the policies of decentralization and including the necessary interrelationships with the other sectors and international cooperation agencies, and including sector planning, monitoring, evaluation, and feedback of the process.
- Examining the situation of the institutions responsible for the sector in order to prepare them, through a process of institutional development, to bring together in a single system the information, planning, financial, commercial, operation and maintenance, training, and other sub-systems that are needed if they are to perform their functions effectively, efficiently, and in a coordinated manner, adapted to the needs of the communities they serve, within their corresponding institutional framework.
- Giving high priority to incorporating water quality control in water supply programs.

- Developing policies and financial systems that take into consideration the economic situation of the countries and the needs of the poorer population in the urban and rural areas, at the same time ensuring the financial viability of the institutions in order to facilitate the development of adequate water supply and sanitation services for all.
- Adopting policies for the application and development of appropriate technologies in order to reduce costs of the installations and of operation and maintenance.
- Developing and applying strategies for increasing community participation, including the participation of women, in the various phases of development of water supply and sanitation services.
- Seeking an effective linkage between primary health care and the programs for water supply and sanitation.
- Developing and institutionalizing intersectoral cooperation and coordination, and interinstitutional cooperation, so as to make the programs and actions more effective, for the benefit of all involved.
- Strengthening the international cooperation mechanisms so as to make possible the most rapid and efficient use of the economic and technical resources provided by the external support agencies working in the sector.
- Develop and apply policies for the integrated and interagency management of the hydraulic resources, including the various uses and the need to preserve, recuperate, use, and reuse them with conservation criteria and a broader application of the principle of efficient use of water.

**In summary, the countries of the Region are advancing toward the goals of the IDWSSD. However, these advances are slower than expected, and there are major disparities among countries. The work that remains to be done will require renewed efforts, from both the countries and the international cooperation agencies. What has been done in the Decade (1981-1990) needs to be consolidated and completed, paying attention to quality, wastewater treatment, and control of contamination, including the implications of these, as services are expanded. Each country will have to identify and define with greater precision the problems, with adequate information, and plan and implement the actions needed for correcting and controlling them.**

## REFERENCES

1. United Nations. Report of the United Nations Conference on Water. Mar del Plata, 14-25 March 1977.
2. United Nations. Report of HABITAT: United Nations Conference on Human Settlements. Vancouver, 31 May - 11 June 1976.
3. Inter-American Development Bank. Annual Report 1989. Washington, February 1990.
4. United Nations - Economic Commission for Latin America and the Caribbean. Water Supply and Sanitation for the Poor: The Achievements of the International Drinking Water Supply and Sanitation Decade in Latin America and the Caribbean. LC/L. 481. 16 November 1988.
5. Campbell, Tim. "Water Supply and Wastewater Services and Excreta Disposal to Low-Income Urban Settlements in Latin America and the Caribbean." Proceedings of the Symposium on Drinking Water and Sanitary Disposal of Excreta in Marginal Urban Areas. Pan American Health Organization, 5-9 November 1984, Santiago, Chile.
6. Centro Latinoamericano de Demografía/Organización Panamericana de la Salud. La Población Urbana y Rural y sus Condiciones de Vida, Enero 1989. (Documento no publicado).
7. World Health Organization/United Nations Environment Programme. GEMS: Global Environment Monitoring System. Global Pollution and Health: Results of Health-related Environmental Monitoring. UNEP and WHO 1987.
8. United Nations - Economic Commission for Latin America and the Caribbean. The Water Resources of Latin América and the Caribbean: Water Pollution, Document LC/L.499, 2 May 1989.
9. CESI: Country External Support Information System. World Health Organization, Geneva.
10. Informe de Diagnóstico Situacional Preliminar y de Avance de Ejecución de las Actividades del Proyecto de Evaluación de la Efectividad de Tecnologías de Conservación de Agua en los Pueblos Jóvenes de Chimbote, Perú. SENAPA, Lima, Perú.
11. Pan American Health Organization. Regional Symposium on Water Pollution Control, Caracas, 16-21 August, 1970.



12. Pan American Health Organization. Maternal and Child Health Program. PAHO Epidemiological Bulletin, Volume 5, No. 4, 1984.
13. Abraham Horwitz, Ingeniería Sanitaria y Ambiental: Importancia de la Planificación en Relación con las Necesidades de Salud. Boletín de la Organización Panamericana de la Salud, Vol. 101, No. 3, 1986.
14. Resolution WHA 34.25 of the 34<sup>th</sup> World Health Assembly. Geneva, May 1981.
15. Pan American Health Organization. Strategies for Extending and Improving Potable Water Supply and Excreta Disposal Services During the Decade of the 1980s. Scientific Publication No. 390, 1979.

## *ANNEXES*

- I. Member Countries of the Pan American Health Organization/World Health Organization and Surface Area in Km<sup>2</sup>.
- II. The Americas: Total Population, by Regions and Countries 1980-2000.
- III. Urban Agglomerations of Latin America and the Caribbean With Population of Two Millions or More in 1985, Clasified by Size (Millions), 1960-2000.
- IV. International Drinking Water Supply and Sanitation Decade Population Served With Water Supply, Sewerage and Sanitary Excreta Disposal Services as of December 1980 (Base Year for the Decade).
- V. International Drinking Water Supply and Sanitation Decade Population Expected to have Water Supply, Sewerage and Sanitary Excreta Disposal Services at the End of 1990, According to Goals Established by 25 Countries (Decade Goals)
- VI. International Drinking Water Supply and Sanitation Decade Population Served With Water Supply, Sewerage and Sanitary Excreta Disposal, Data of Progress Achieved as of December 1988.
- VII. Investments and Technical Cooperation Funds, in Water Supply, Sewerage, and Excreta Disposal in Latin America and the Caribbean, (Current Values US\$ - Millions).
- VIII. Life Expectancy at Birth.
- IX. Diseases Related to Water Supply and Sanitation.

MEMBER COUNTRIES OF THE PAN AMERICAN HEALTH ORGANIZATION/  
WORLD HEALTH ORGANIZATION, AND  
SURFACE AREA IN Km<sup>2</sup>

COUNTRY	AREA (Km <sup>2</sup> )
Antigua y Barbuda	442
Argentina	2,766,889
Bahamas	13,935
Barbados	431
Belize	22,965
Bolivia	1,098,581
Brazil	8,511,965
Canada	9,976,139
Chile	756,945
Colombia	1,138,914
Costa Rica	50,700
Cuba	114,524
Dominica	751
Dominican Republic	48,734
Ecuador	283,561
El Salvador	21,041
United States	9,363,123
Grenada	344
Guatemala	108,889
Guyana	214,969
Haiti	27,750
Honduras	112,088
Jamaica	10,991
Mexico	1,972,547
Nicaragua	130,000
Panama	77,082
Paraguay	406,752
Peru	1,285,216
St. Vicent and the Granadines	388
Saint Kitts-Nevis	a/ 233
Saint Lucia	616
Suriname	163,265
Trinidad and Tobago	5,130
Uruguay	176,215
Venezuela	912,050
TOTAL	39,774,165

SOURCE: 1979 Demographic Yearbook, United Nations, 1981.

a/ Environmental Health Profile of Caribbean Countries. CARICOM/PAHO 1988.

THE AMERICAS: TOTAL POPULATION, BY REGIONS AND COUNTRIES  
1980-2000 (IN THOUSANDS)

COUNTRIES	1980	1985	1986	1987	1988	1989	1990	1995	2000
THE AMERICAS	614631	669657	680720	691809	702919	714051	725192	780803	835533
LATIN AMERICA	352967	394300	402836	411491	420248	429078	437951	482762	527784
Argentina	28237	30331	30737	31137	31534	31929	32322	34264	36238
Bolivia	5570	6371	6548	6730	6918	7113	7314	8422	9724
Brazil	121286	135564	138493	141452	144428	147404	150368	165083	179487
Colombia	26906	29879	30459	31058	31677	32317	32978	36182	39397
Costa Rica	2284	2642	2716	2791	2866	2941	3015	3374	3711
Cuba	9679	10078	10176	10283	10393	10503	10608	11091	11504
Chile	11145	12122	12327	12536	12748	12961	13173	14237	15272
Dominican Republic	5697	6416	6565	6716	6867	7019	7170	7915	8621
Ecuador	8123	9317	9565	9816	10070	10327	10587	11934	13319
El Salvador	4525	4768	4846	4934	5032	5138	5252	5943	6739
Guatemala	6917	7963	8195	8434	8681	8935	9197	10621	12222
Haiti	5413	5922	6033	6147	6263	6382	6504	7149	7838
Honduras	3662	4383	4531	4679	4829	4982	5138	5968	6846
Mexico	70416	79376	81201	83039	84886	86740	88598	97967	107233
Nicaragua	2771	3272	3384	3501	3622	3745	3871	4539	5261
Panama	1956	2180	2227	2274	2322	2370	2418	2659	2893
Paraguay	3147	3693	3807	3922	4039	4158	4277	4893	5538
Peru	17295	19698	20208	20727	21256	21791	22332	25123	27952
Uruguay	2914	3008	3026	3043	3060	3077	3094	3186	3274
Venezuela	15024	17317	17792	18272	18757	19246	19735	22212	24715
CARIBBEAN AND OTHER TERRITORIES	9856	10580	10734	10889	11046	11202	11361	12146	12919
Antillas	172	180	183	186	188	191	193	207	221
Bahamas	224	242	246	249	253	257	260	278	297
Barbados	249	253	254	256	257	259	261	272	285
Belize	145	163	167	170	174	178	182	201	221
Dominica	73	76	77	78	79	80	81	87	93
French Guyana	69	82	84	86	88	90	92	102	112
Granada	92	96	97	98	100	101	103	110	117
Guadalupe	327	334	336	337	338	339	340	346	354
Guyana	865	953	971	989	1006	1023	1040	1119	1197
Jamaica	2173	2336	2372	2409	2446	2483	2521	2706	2886
Martinica	326	328	329	329	330	330	331	338	352
Puerto Rico	3199	3451	3502	3554	3606	3658	3709	3958	4192
Saint Lucia	118	128	129	131	133	135	136	146	156
Suriname	355	375	380	386	392	397	403	435	469
Trinidad & Tobago	1095	1185	1204	1223	1243	1263	1283	1385	1480
Other Territories	374	398	403	408	413	418	426	456	487
NORTH AMERICA	251808	264777	267150	269429	271625	273771	275880	285895	294830
Canada	23941	25379	25633	25870	26093	26310	26525	27567	28508
United States	227757	239283	241401	243441	245414	247341	249235	258204	266194
Other Territories	110	115	116	118	118	120	120	124	128

SOURCE: CELADE (1990). United Nations (1989).

**URBAN AGGLOMERATIONS OF LATIN AMERICA AND THE CARIBBEAN WITH  
POPULATION OF TWO MILLIONS OR MORE IN 1985  
CLASIFIED BY SIZE (MILLIONS)  
1960 - 2000**

AGGLOMERATION	COUNTRY	1960	1970	1980	1990	2000
Mexico City*	Mexico	4.93	8.74	13.97	19.37	24.44
Sao Paulo	Brasil	4.71	8.06	12.50	18.42	23.60
Buenos Aires*	Argentina	6.69	8.31	9.88	11.58	13.05
Rio de Janeiro	Brasil	4.93	7.04	8.98	11.12	13.00
Lima-Callao*	Peru	1.69	2.84	4.41	6.50	8.78
Bogota*	Colombia	1.30	2.37	3.91	5.59	6.94
Santiago*	Chile	2.03	2.84	3.70	4.70	5.58
Caracas*	Venezuela	1.28	2.05	2.94	3.96	4.79
Belo Horizonte	Brasil	0.87	1.59	2.52	3.81	5.01
Porto Alegre	Brasil	1.01	1.52	2.22	3.11	3.94
Recife	Brasil	1.21	1.78	2.34	2.98	3.57
Guadalajara	Mexico	0.88	1.51	2.28	3.06	3.89
Monterrey	Mexico	0.88	1.23	2.02	2.88	3.75
Salvador	Brasil	0.71	1.14	1.76	2.60	3.39

\* Urban Agglomeration that contains the capital city.

SOURCES: Adapted from Publication ST/ESA/SER.A/112, Population Studies No. 112- Studies of Population. "Prospects of World Urbanization, 1988", United Nations, New York, 1989.





INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE  
POPULATION SERVED WITH WATER SUPPLY, SEWERAGE AND SANITARY EXCRETA DISPOSAL  
DATA OF PROGRESS ACHIEVED AS OF DECEMBER 1988\*\*  
(POPULATION IN THOUSANDS)

COUNTRY	DRINKING WATER SUPPLY												SEWERAGE AND EXCRETA DISPOSAL										
	TOTAL POPULATION SERVED			URBAN POPULATION SERVED				RURAL POPULATION SERVED		TOTAL POPULATION SERVED				URBAN POPULATION SERVED				RURAL POPULATION SERVED					
	TOTAL	URBAN	RURAL	HOUSE CONNec- TION	EASY ACCESS	TOTAL	%	HOUSE CONNec- TION	EASY ACCESS	TOTAL	%	TOTAL	%	HOUSE CONNec- TION	OTHERS	TOTAL	%	HOUSE CONNec- TION	OTHERS	TOTAL	%	TOTAL	%
ARGENTINA	31074	26219	4855	18208	1763	19971	64	18208	944	19152	73	819	17	10261	17379	27640	89	10261	15958	26219	100	1421	29
BAHAMAS <sup>a/</sup>	241	136	105	126	114	240	100	126	9	135	99	105	100	22*	114*	136*	56*	22	114	136	100	0*	0*
BARBADOS <sup>b/</sup>	253	89	164	87	165	252	100	87	2	89	100	163	99	18*	24*	42*	17*	18	24	42	47	0*	0*
BELIZE	175	90	85	70	65	135	77	70	5	75	83	60	71	20	107	127	73	20	55	75	83	52	61
BOLIVIA	6928	3471	3457	2311	898	3209	46	2311	374	2685	77	524	15	1394	960	2354	34	1394	520	1914	55	440	13
BRAZIL	14426	106587	37839	96577	42252	138829	96	96577	9832	106409	100	32420	86	45000	68155	113155	78	45000	49896	94896	89	18259	48
CHILE	12748	10497	2251	10287	672	10959	86	10287	210	10497	100	462	21	8654	1983	10637	83	8654	1843	10497	100	140	6
COLOMBIA	31200	22100	9100	14500	12800	27300	88	14500	4900	19400	88	7900	87	12000	8300	20300	65	12000	6700	18700	85	1600	18
COSTA RICA	2866	1719	1147	1685	997	2682	94	1685	34	1719	100	963	84	722	2063	2785	97	722	997	1719	100	1066	93
DOMINICAN REPUBLIC	6866	4038	2828	1913	1624	3537	52	1913	820	2733	68	804	28	882	3220	4102	60	882	2209	3091	77	1011	36
ECUADOR	10203	5529	4674	3963	1918	5881	58	3963	190	4153	75	1728	37	3441	2317	5758	56	3441	719	4160	75	1598	34
EL SALVADOR	5032	2349	2683	1672	379	2051	41	1672	110	1782	76	269	10	1339	1706	3045	61	1339	671	2010	86	1035	39
GUATEMALA	8681	3287	5394	2393	2830	5223	60	2393	608	3001	91	2222	41	1617	3325	4942	57	1617	741	2358	72	2584	48
GUYANA	756	246	510	196	413	609	81	196	34	230	95	379	74	70	577	647	86	70	138	208	85	439	86
HAITI	5562	1581	3981	474	1851	2325	42	474	403	877	55	1448	36	0	1228	1228	22	0	650	650	41	578	15
HONDURAS	4625	1947	2678	1600	1747	3347	72	1600	140	1740	89	1607	60	1178	1709	2887	62	1178	539	1717	88	1170	44
MEXICO	89500	63500	26000	47000	14498	61498	69	47000	3928	50928	80	10570	41	33518	6917	40435	45	33518	4689	38207	60	2228	9
NICARAGUA	3622	2109	1513	1436	492	1928	53	1436	206	1642	78	286	19	685*	0*	685*	19*	685	N/A	685*	32*	0*	0*
PANAMA	2282	1111	1171	1063	823	1886	83	1063	48	1111	100	775	66	805	1104	1909	84	805	305	1110	100	799	68
PARAGUAY	3900	1733	2167	866	420	1286	33	866	260	1126	65	160	7	437	1810	2247	58	437	510	947	55	1300	60
PERU	21256	13890	7366	8679	3743	12422	58	8679	2100	10779	78	1643	22	7640	1223*	8863*	42*	7640	N/A	7640*	55*	1223	17
SURINAME	395	296	99	2	282	284	72	2	229	231	78	53	54	9	212	221	56	9	178	187	63	34	34
TRINIDAD & TOBAGO	1230	840	390	730	450	1180	96	730	110	840	100	340	87	250	970	1220	99	250	590	840	100	380	97
URUGUAY	2990	2607	384	2387	152	2539	85	2387	132	2519	97	20	5	1436	370	1806	60	1436	119	1555	60	251	65
VENEZUELA <sup>a/</sup>	18757	15604	3153	12142	4614	16756	89	12142	1814	13956	89	2800	89	10611	6719	17330	92	10611	4509	15120	97	2210	70
TOTALS	415568	291575	123994	230367	95962	326329	79	230367	27442	257809	88	68520	55	142009	132492	274501	66	142009	92674	234683	80	39818	32

25 Countries.  
a/ Base information not available, 1983 data utilized.

\* Insufficient Data.  
b/ 1985 data utilized.

\*\* Data adjusted according to information provided by the countries in 1987 and 1988.  
N/A Information Not Available.

- In case where information not provided by countries, best available information from other sources used.
- Due to insufficiency of data, discrepancies exist in the regional totals and percentages.
- Easy access is defined as a public water fountain at 200 meter or less from the home.



**INVESTMENTS AND TECHNICAL COOPERATION FUNDS, IN WATER SUPPLY, SEWERAGE, AND  
EXCRETA DISPOSAL IN LATIN AMERICA AND THE CARIBBEAN  
(CURRENT VALUES US\$ - MILLIONS)**

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*	TOTAL 1981-1990
Inter-American Development Bank (IDB)	191.8	265.3	245.3	340.8	141.0	351.3	419.4	422.0	30.9	N/A	2,407.80
International Bank for Reconstruction and Development (IBRD)	346.5	40.6	424.2	28.6	163.8	175.0	64.0	252.3	320.0	124.7	1,939.70
Caribbean Development Bank (CDB)	1.6	2.6	0.2	12.5	0.0	5.3	1.0	7.7	7.3	7.5	45.70
Canadian International Development Agency (CIDA)	6.5	0.1	22.6	15.9	4.4	9.1	4.4	0.0	0.0	0.0	63.00
AID	13.2	13.4	26.6	16.2	18.3	2.5	1.3	20.1	-	-	111.60
GTZ	-	-	-	7.8	14.4	22.3	4.0	10.6	9.5	4.8	73.40
Others**											
<b>Total by Years</b>	<b>559.60</b>	<b>322.00</b>	<b>718.90</b>	<b>421.80</b>	<b>341.90</b>	<b>565.50</b>	<b>494.10</b>	<b>712.70</b>	<b>367.70</b>	<b>137.00</b>	<b>4,641.20</b>
<b>National Counterpart Funds for Projects:</b>											
- IDB	99.7	167.2	270.0	493.1	82.7	387.7	348.7	663.8	9.1	N/A	2,522.00
- IBRD	N/A	N/A	N/A	25.7	260.1	168.6	50.0	405.9	339.0	77.7	1,327.00
<b>Total Counterpart Funds</b>	<b>99.70</b>	<b>167.20</b>	<b>270.00</b>	<b>518.80</b>	<b>342.80</b>	<b>556.30</b>	<b>398.70</b>	<b>1,069.70</b>	<b>348.10</b>	<b>77.70</b>	<b>3,849.00</b>
<b>GRAND TOTAL</b>	<b>659.30</b>	<b>489.20</b>	<b>988.90</b>	<b>940.60</b>	<b>684.70</b>	<b>1,121.80</b>	<b>892.80</b>	<b>1,782.40</b>	<b>715.80</b>	<b>214.70</b>	<b>8,490.20</b>

SOURCE: Information provided by IDB, IBRD and from CESI for the indicated bilateral agencies.

\* *Parcial Information.*

\*\* Various internationals, bilaterals and non government agencies, such as UNICEF, UNDP, UNEP, CIID, SIDA, FINNIDA, NORAD, Italy, Holand, Japan, Spain, France, Israel, The United Kingdom, CARE, etc. carry out activities in some countries but detailed information on investments and technical cooperation is not available.

N/A Information Not Available.

## LIFE EXPECTANCY AT BIRTH

COUNTRIES	LIFE EXPECTANCY AT BIRTH 1975 - 1980			LIFE EXPECTANCY AT BIRTH 1985 - 1990		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
Argentina	69.2	66.0	72.5	70.6	67.3	74.0
Barbados	70.0	67.6	72.5	73.0	71.0	77.0
Bolivia	48.6	46.5	50.9	53.1	50.9	55.4
Brazil	61.8	60.1	63.6	64.9	62.3	67.6
Canada	73.5	70.1	77.0	76.7	73.3	80.3
Chile	65.7	62.4	69.0	71.5	68.1	75.1
Colombia	62.2	60.0	64.5	64.8	62.6	67.2
Costa Rica	69.7	67.5	71.9	74.7	72.4	77.0
Cuba	72.8	71.1	74.4	74.0	72.2	75.8
Dominican Rep.	60.3	58.4	62.2	65.9	63.9	68.1
Ecuador	60.0	58.0	62.0	65.4	63.4	67.6
El Salvador	62.2	60.0	64.5	62.1	58.0	66.5
United States	72.9	69.1	77.0	75.4	71.9	79.0
Guatemala	57.8	56.9	58.8	62.0	59.7	64.4
Guyana	69.1	66.5	71.7	69.7	67.3	72.3
Haiti	50.7	49.1	52.2	54.7	53.1	56.4
Honduras	57.1	55.4	58.9	64.0	61.9	66.1
Jamaica	70.1	67.8	72.5	74.0	71.3	76.7
Mexico	64.4	62.4	66.5	68.9	65.7	72.3
Nicaragua	55.2	53.5	57.1	63.3	62.0	64.6
Panama	69.6	67.5	71.9	72.1	70.1	74.1
Paraguay	64.1	61.9	66.4	66.9	64.8	69.1
Peru	57.1	55.7	58.6	61.4	59.5	63.4
Suriname	67.2	64.8	69.8	69.5	67.1	72.1
Trinidad & Tobago	68.9	65.9	72.0	70.2	67.7	72.8
Uruguay	69.5	66.3	72.8	71.0	67.8	74.4
Venezuela	66.2	63.6	69.0	69.7	66.7	72.8

SOURCE: United Nations. World Population Prospects 1988 as assessed in 1980. New York 1981. United Nations. World Population Prospects 1988. New York 1988.

DISEASES RELATED TO WATER SUPPLY AND SANITATION

- AMEBIASIS (AMOEBIC DYSENTERY)
- ANQUILOSTOMIASIS
- ASCARIASIS (ROUNDWORM)
- BALANTIDIASIS
- CAMPYLOBACTER ENTERITIS
- CISTICERCOSIS/TENIASIS (SOLITARIA)
- CRIPTOSPORIDIOSIS
- E. COLI (ENTEROINVASIVA, ENTEROPATOGENA AND ENTEROTOXICA)
- ESTRONGILOIDIASIS
- FASCIOLIASIS (LIVER FLUKE)
- FASCIOLOPSIASIS (INTESTINAL FLUKE)
- GIARDIASIS
- HEPATITIS
- LEPTOSPIROSIS
- PARAGONIMIASIS (LUNG FLUKE)
- PARATYPHOID
- POLIOMYELITIS
- ROTAVIRUS (GASTROENTERITIS)
- SHIGELLOSIS (BACILLARY DYSENTERY)
- TRICHURIASIS (WHIPWORM)
- TYPHOID