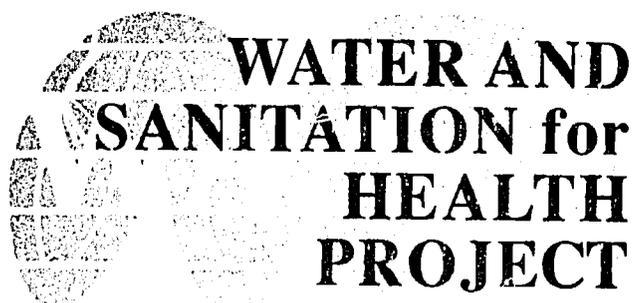


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PLANNING FOR WATER AND SANITATION PROGRAMS IN THE CARIBBEAN

Field Report No. 335
February 1992



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WASH Field Report No. 335

**PLANNING FOR WATER
AND SANITATION PROGRAMS
IN THE CARIBBEAN**

Prepared for the Bureau for Latin America and the Caribbean,
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under WASH Task No. 219

by

Michelle Mendez

February 1992

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Related WASH Reports

Planning for Water and Sanitation Programs in Central America. Field Report No. 334, August 1991.

Planning for Central America Water and Sanitation Programs. Field Report No. 301, June 1990.

Planning for Water and Sanitation Programs in Bolivia, Ecuador, and Peru. Field Report No. 302, June 1990.

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About the Author

Michelle A. Mendez has been a Project Associate with the International Science and Technology Institute, Inc. In addition to her work with WASH, Ms. Mendez has worked on a number of A.I.D. projects, and has contributed to several reports, including the Quick Reference Guide to Private Sector Projects in Latin America and the Caribbean. She recently co-authored an assessment of supplementary food programs in 15 Latin American countries for a multilateral donor agency. Ms. Mendez is a graduate of Princeton University's Woodrow Wilson School of Public and International Affairs.

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ACRONYMS

A.I.D.	U.S. Agency for International Development/Washington
CARE	An international private voluntary organization
CIDA	Canadian International Development Agency
EEC	European Economic Community
GDP	gross domestic product
GNP	gross national product
GOB	Government of Barbados
GODR	Government of the Dominican Republic
GOG	Government of Grenada
GOH	Government of Haiti
GOJ	Government of Jamaica
GTZ	German Agency for Technical Cooperation
IDB	Inter-American Development Bank
IDWSSD	International Drinking Water Supply and Sanitation Decade (1981-90)
JICA	Japanese International Cooperation Agency
KfW	Reconstruction Loan Corporation (Federal Republic of Germany)
LAC	Bureau for Latin America and the Caribbean (A.I.D.)
MOH	Ministry of Health
NGO	Nongovernmental organization
PAHO	Pan American Health Organization (unit of World Health Organization)

PVO	Private voluntary organization
SSID	<i>Servicios Sociales de Iglesias Dominicanas</i> (a PVO in the Dominican Republic)
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development/overseas missions
WASH	Water and Sanitation for Health Project

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Individuals and Organizations Contacted for Information

AGENCY FOR INTERNATIONAL DEVELOPMENT

Muriel Jolivet - USAID/Haiti
Thomas McAndrews - USAID/Jamaica
Tim Truitt - USAID/Dominican Republic
Brinley Selliah - RDO/C

CARE

Carol Puzone
Curt Schaefer

CANADIAN INTERNATIONAL DEVELOPMENT AGENCY

Leopold Battel (Haiti)
Brian Grover
Barbara Levine
Alf McCabe (Grenada)
Bob Morrow (Barbados)
Ron Pritchard

GERMAN AGENCY FOR TECHNICAL COOPERATION (GTZ)

Dieter Neuhaus
D. Neumann

INTERAMERICAN DEVELOPMENT BANK (IDB)

Edward Agostini
Graciela Cintura
Hugo Pirella
Earl Sealy

ISTI

Roy Miller (Center for International Health Information)

GERMAN RECONSTRUCTION LOAN COMPANY (KfW)

Dieter Neuhaus

PAN AMERICAN HEALTH ORGANIZATION (PAHO)

Horst Otterstetter
Raymond Reed
Rodolfo Saenz
Homero Silva (Jamaica)

Save the Children Foundation

Mark Schomer

UNITED NATIONS DEVELOPMENT PROGRAM (UNDP)

Julio Grieco
Frank Harvelt
Paul Koulen
Ellia Villanueva

UNITED NATIONS CHILDREN'S FUND (UNICEF)

Vanessa Tobin

WASH

Dan Campbell

WORLD BANK

Roy Ramani

PREFACE

CHOLERA AND THE WATER AND SANITATION SECTOR IN LATIN AMERICA

The cholera epidemic in this hemisphere represents a public health risk for the Caribbean Region region and a challenge to USAID missions in the region. The lack of safe water and basic sanitation documented in this study makes it very likely that cholera will become endemic throughout the Caribbean Region.

The control of the spread of cholera and its ultimate reduction and elimination will only occur with the improvement of environmental health conditions. Specific areas that need to be assessed, improved, and monitored include water quality, water quantity, waste management, and hygiene behavior. Most critical for the Caribbean Region is the need to develop and implement strategies for extending low-cost, appropriate sanitation coverage. Similarly, increased efforts to improve health education and hygiene behavior are crucial. Wastewater treatment, while essential to the long-term control of cholera and other waterborne diseases, should be selectively implemented—in the high impact areas—because of its relatively high cost vs. the financial condition of most Caribbean Region countries.

Cholera is bringing increased attention to the need to improve water supply and sanitation services in the Caribbean Region. There is an exceptional opportunity for the sector to attract funds for investing to new and rehabilitated infrastructure. But, the improvements that are needed will not be achieved by simply pouring more money into the sector. Current information—particularly from the recent assessment of a collaborative program for the Caribbean Region—indicates that the present capacity of the sector to absorb and effectively use financial and human resources is limited. Building that capacity will require well-focused technical assistance, not only to develop institutional and human resources, but also to address fundamental weaknesses in sector organization and policies. A well-organized sector with a sound policy framework would then enable effective use of investment funds and ensure the coordination of the efforts of governments, NGOs, the private sector, and external support agencies.

EXECUTIVE SUMMARY

This report is the first update of a Water and Sanitation for Health (WASH) study of the water and sanitation sector in five Caribbean countries prepared for the LAC Bureau of the U.S. Agency for International Development. The study covers Barbados, the Dominican Republic, Grenada, Haiti and Jamaica.

This study assesses the current (through the end of 1990) availability of water supply and sanitation services in the selected Caribbean countries, and measures progress toward increased coverage. This report analyzes ongoing and proposed investments to estimate the additional funding needed to meet the proposed targets.

Definitional Framework

The definitional framework employed in this report is the same as that used in the previous studies. Water and sanitation coverage is a tally of the population with access to at least minimal services, and is expressed either in terms of numbers of persons or as a percentage of the total estimated population. The following definitions are used:

- Population centers of 2,000 or more are considered urban, all others are rural.
- Water supply coverage includes persons with access through a direct connection or a water system outlet (standpipe or public fountain) within 200 meters of the home. Coverage estimates also count persons services by water vendors.
- Sanitation coverage includes those with an in-house or in-compound sewerage connection, septic tank, or latrine.
- Regional coverage refers to the group of five countries, and should not be interpreted to represent the Caribbean region as a whole.

This report does not mark distinctions in the quality of service provided. All persons reported to have coverage are considered to have at least minimal access to water and sanitation services as defined above.

Access to Water and Sanitation Services in 1990

In 1990, access to water supplies in the region ranged from a low of 39 percent in Haiti to a high of 100 percent in Barbados. With 21 percent coverage, Haiti also provided the lowest

access to sanitation services. Barbados, with full coverage, ranked highest in access to sanitation service. Coverage figures for each country are illustrated graphically in Figure 1.

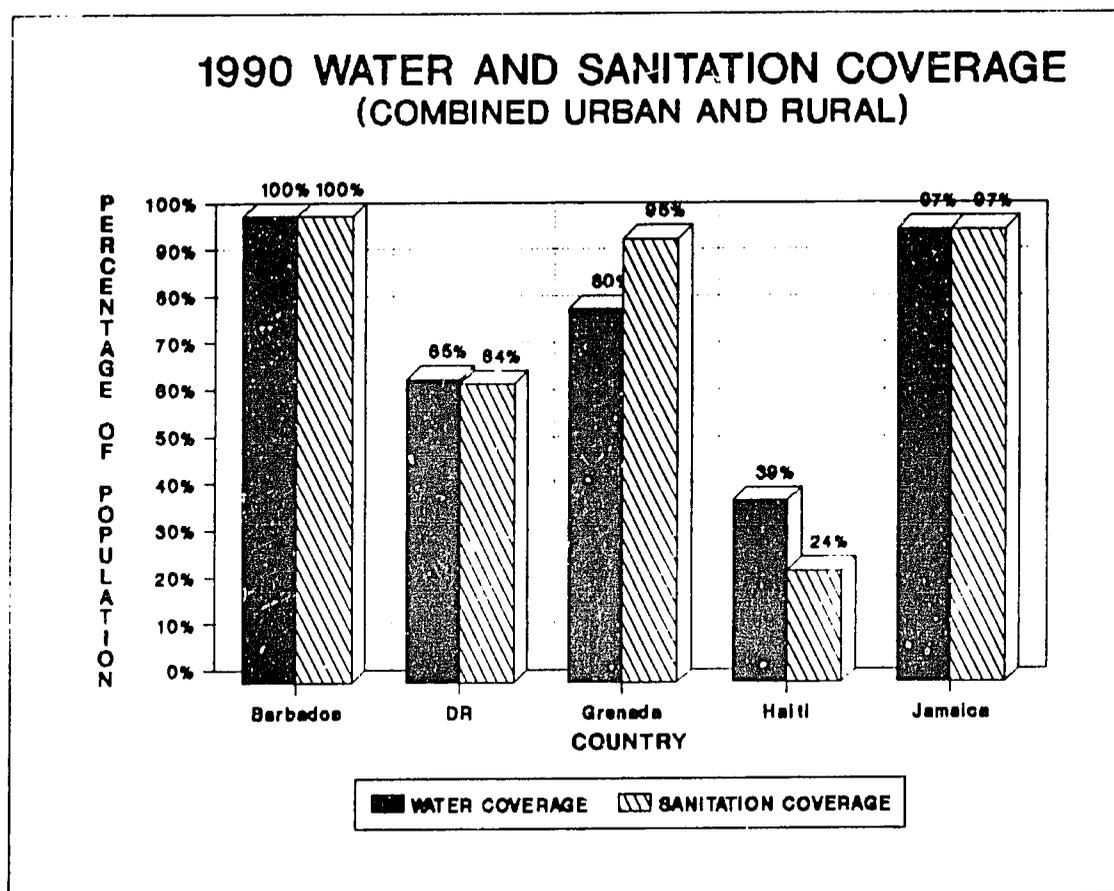


Figure 1

Overall, an estimated 61 percent of the 16 million inhabitants of the five Caribbean countries had access to water supply services and 55 percent had access to sanitation. Urban areas have achieved substantial gains in access to both water and sanitation services since 1985, the baseline for this study. In 1990, 85 percent of urban residents had adequate water supply access, and 76 percent had access to sanitary waste systems. These figures represent gains of 13 percent in water and nine percent in sanitation, from 72 percent and 67 percent, respectively. During the same timeframe, the disparity between urban and rural service provision has increased substantially. In 1990, only 39 percent of rural dwellers in the region had access to water, and 35 percent had access to sanitation services. Rural water coverage has increased by only one percent since 1985, while sanitation coverage has declined by eight percent. Regional coverage for urban and rural areas is illustrated in Figure 2 below.

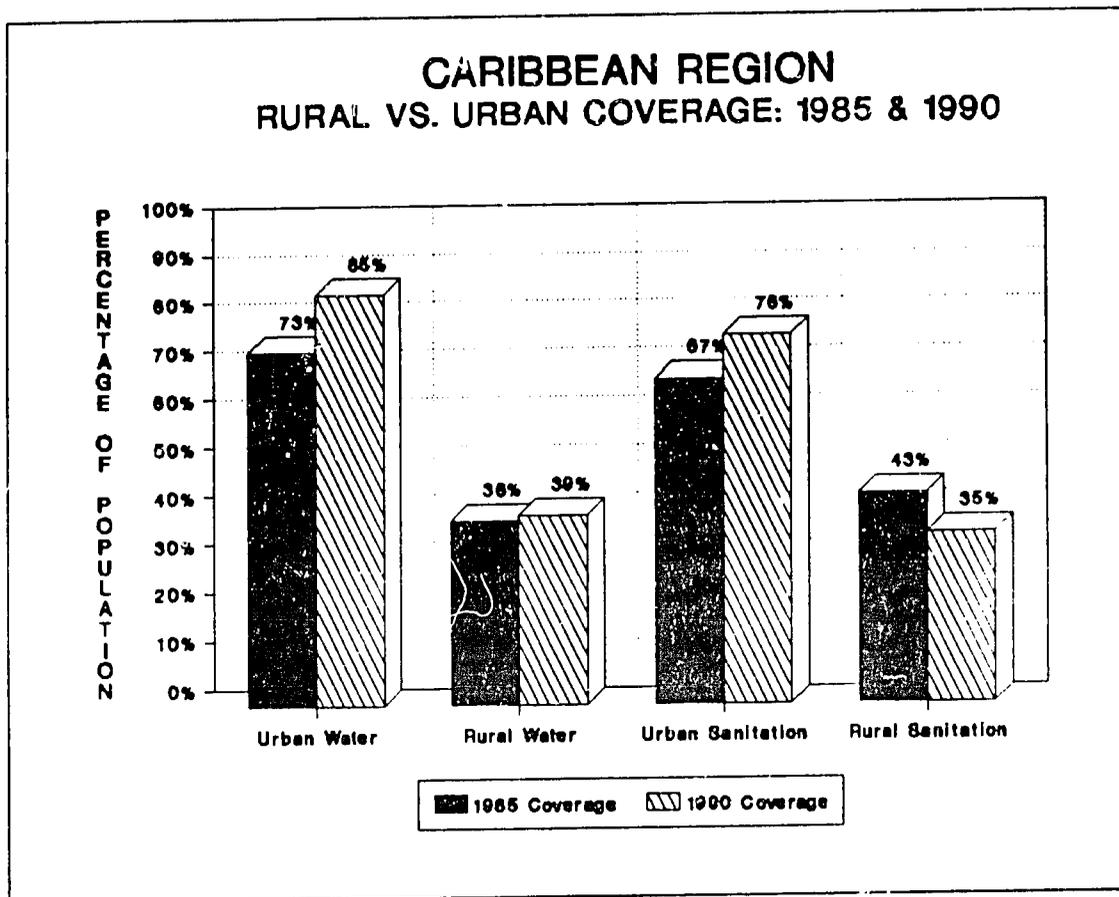


Figure 2

1995 WASH Targets

The coverage objectives referenced in this report are goals for urban and rural populations in each country with access to water and sanitation facilities. The targets, which are expressed as percentages, are estimates of the progress required by 1995 if full coverage is to be achieved by the year 2020. These goals do not necessarily reflect each country's current development plans for the sector.

The WASH targets seek to raise regional coverage from 61 percent in 1990 to 69 percent in 1995, and sanitation coverage from 55 percent to 63 percent. Based on current population trends, approximately 2.3 million more persons will require access to safe water and 2.2 million will need access to sanitation to meet the targets.

Funding Requirements and Shortfalls

Funding needed to meet the 1995 targets was estimated by multiplying the number of additional persons to receive coverage by per capita costs of providing services in each country. Unit costs are based on figures developed by PAHO.

The funding needed to increase regional access to water supplies and sanitation is approximately \$369 million (Table 1). Required regional investments in urban water are nearly \$149 million, which, added to an estimated \$71 million for rural water, comprise a total of \$219 million. A commitment of approximately \$149 million is needed in sanitation, with \$122 million required to meet urban coverage goals, and \$27 million needed for rural areas. The disparity in costs to meet urban and rural targets is in part a consequence of heavy urbanization throughout the region. It is also a result of differences in per capita unit costs, largely explained by the widespread installation of latrines rather than sewerage services in rural areas.

Table 1

	WATER SUPPLY			SANITATION			TOTAL
	SUBTOTAL	URBAN	RURAL	SUBTOTAL	URBAN	RURAL	
ESTIMATED FUNDING REQUIRED	219,187	148,572	70,615	149,315	122,029	27,286	368,502
CURRENT COMMITMENTS *	14,198	9,214	4,984	8,652	7,994	658	22,850
DEFICIT	204,989	139,358	65,631	140,663	114,035	26,628	345,652

* Includes only those commitments which will expand coverage to meet the WASH target levels.

WASH's estimate of current funding commitments for the region, shown in Table 1, includes only investments in efforts to extend coverage to persons currently unserved by basic facilities, and excludes efforts in areas such as rehabilitation and institutional strengthening. Funding shortfalls, also detailed in Table 1, are the difference between current commitments and the total estimated cost to achieve the WASH goals. Approximately six percent (\$22 million) of the \$369 million necessary to reach the targeted coverage levels is currently committed, resulting in a deficit of \$346 million. Deficits by subsector are: \$139 million for urban water; \$66 million for rural water; \$114 million for urban sanitation; and \$27 million for rural sanitation.

Without substantial additional resource commitments, these Caribbean nations will be unable to meet the WASH targets. Each of the countries included in this study face substantial challenges to attaining the 1995 coverage targets. Approximately \$69 million in additional

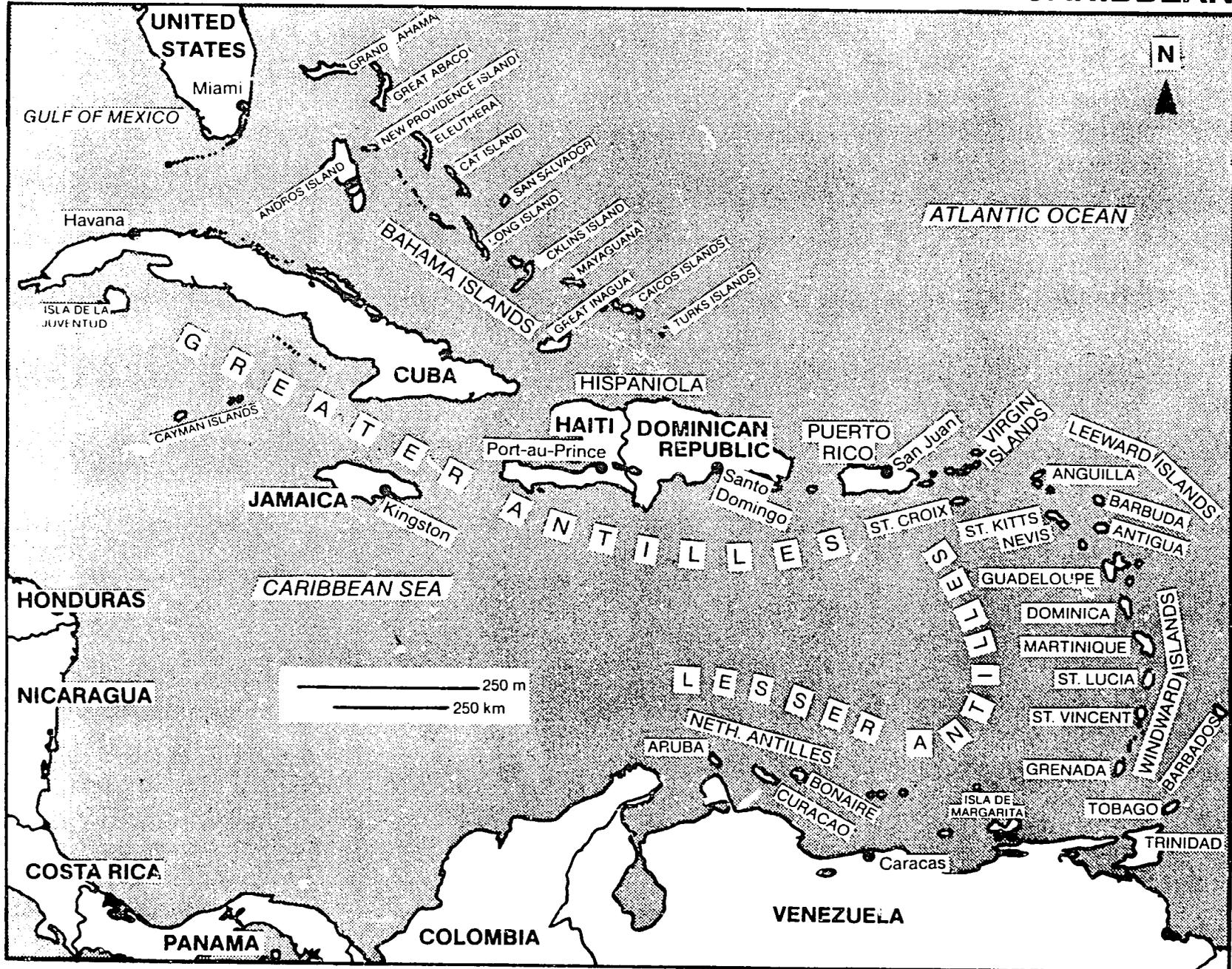
investments must be committed each year over the next five years to eliminate the \$346 million regional deficit.

With deficits of \$111 and \$197 million, respectively, Haiti and the Dominican Republic comprise more than three fourths of the total funding deficit. Coverage in these countries, particularly in rural areas, is dangerously low; these countries must remain priorities for future assistance.

WASH's Lessons Learned

Over the past ten years, WASH has seen that multifaceted challenges must be addressed to achieve the desired results of improving access to water and sanitation services. In addition to installing improved facilities, it is important to provide maintenance systems, health and hygiene education, and to address environmental issues. The Caribbean faces a formidable challenge in the water supply and sanitation sector in the 1990s. In order to meet this challenge, the various agencies, institutions, and communities involved in water and sanitation development must form partnerships at both the policy and operational levels, with a long-term commitment to build the systems and the capacity to maintain them.

THE CARIBBEAN



Chapter 1

INTRODUCTION

1.1 Purpose and Scope

This report is the first of four planned annual updates of a 1989-90 study by the Water and Sanitation for Health (WASH) Project of water and sanitation services and investments in five Caribbean nations for the Bureau for Latin America and the Caribbean (LAC) of the U.S. Agency for International Development (A.I.D.). The countries are Barbados, the Dominican Republic, Grenada, Haiti, and Jamaica.

The report provides available data, through 1990, on the water and sanitation sector and on populations with access to adequate water and sanitation facilities, and estimates the funding required to meet the WASH coverage objectives for 1995 established in the original study. It includes brief descriptions of ongoing and planned efforts by other donor agencies to improve water and sanitation services in the five countries. Based on current and planned donor funding, it develops estimates of additional investments needed to enable each country to meet the target coverage levels.

1.2 Sources

Missions in the Dominican Republic, Haiti, and Jamaica, and A.I.D.'s Regional Development Office/Caribbean (which covers Barbados and Grenada) provided current data on water and sanitation coverage and programs. Other institutions providing information were CARE, the Canadian International Development Agency (CIDA), the German Agency for Technical Cooperation (GTZ), the German Reconstruction Loan Corporation (KfW), the Inter-American Development Bank (IDB), the Pan American Health Organization (PAHO), the United Nations Children's Fund (UNICEF), and the World Bank.

1.3 Definitional Framework

The definitional framework employed in this report is the same as that used in the previous studies and is explained below.

1.3.1 Coverage Data

Water and sanitation coverage is a tally of the population with access to at least minimal services and is expressed either in terms of numbers of persons or as a percentage of the total population. Coverage estimates are provided for the four subsectors within each

country, namely, urban water, urban sanitation, rural water, and rural sanitation. The following definitions are used:

Urban and Rural Populations—Population centers of 2,000 or more are considered to be urban; all other areas are rural.

Water Supply Coverage—Water supply coverage includes persons with access through a direct connection or from a water system outlet (standpipe or public fountain) within 200 meters of the home.

Sanitation Coverage—Sanitation coverage includes service provided by an in-house or in-compound sewerage connection, septic tank, or latrine.

Regional Coverage—References to regional coverage in this report are to the group of five countries and should not be interpreted as applying to the Caribbean region as a whole.

The quality of coverage varies greatly with the different types of service provided (e.g., direct house connections versus communal standpipes) and frequently varies among population centers. For example, as a result of shortages, piped public water supplies are available for only a few hours a day in some cities, while others have continuous service. It is not possible to mark such distinctions in quality in this report. All persons reported to have coverage are considered to have at least minimal access to water and sanitation services as defined above.

It is important to note, however, that some facilities are inadequate from environmental or health standpoints and clearly require upgrading and improvements. As a result, statistics reported for many countries may exaggerate the number of persons with *adequate* coverage. Throughout the region, particularly in rural areas, many populations have access only to rudimentary facilities, such as poorly constructed latrines and gravity-fed systems that supply untreated water. Many urban population centers receive piped water supplies that do not measure up to standards for potable water in industrialized nations. In many areas, water and soil pollution from pesticides poses a threat to human health. Water quality suffers as a result of poor regulatory systems and the lack of enforcement capability, as well as from the lack of resources to install and maintain improved facilities.

In addition to the danger to consumers, water and sanitation systems often pose a long-term threat to the environment. In many countries, untreated domestic and industrial wastewater is dumped into rivers and other bodies of water. There is widespread dumping of solid waste in open-cut dumps and on uncultivated land when volumes exceed the capacity of public collection and disposal systems. Human excreta contaminate soil and groundwater in areas where latrines are not water-sealed or are under-utilized. Although they are beyond the scope of this report, environmental and health issues clearly must be given priority in developing water and sanitation facilities in the region.

Coverage data in several countries are based upon assumptions that differ from the definitional framework for this report. Consequently, WASH has had to use its best judgment to bring the data into conformity with the definitions outlined above. These adjustments are described in the country profile appendices.

1.3.2 Excluded Funds

Only expenditures for projects that expand the number of persons with access to water and sanitation services are included in the investment analysis. Consequently, funding for a number of projects, particularly some of the large loans made by the IDB and the World Bank, have not been included in their entirety. Many of these loan programs support the rehabilitation or upgrading of existing systems or the construction of off-site facilities (indirect-user facilities, such as treatment plants, dams, reservoirs) to improve or sustain existing services. Frequently, these projects do support some system expansion. Therefore, as in the 1990 study, 10 percent of the estimated outstanding disbursements has been considered as funding that supports the extension of coverage.

Non-infrastructure projects, which support activities such as institutional development of water and sewerage agencies, management education, operation and maintenance training, technology transfer, and health and sanitation education, are also excluded from the funding analysis. These projects, though an essential component of efforts to augment water and sanitation services, do not directly provide for service expansion.

Funding already expended on ongoing projects has also been excluded from the investment analysis. Where details of disbursement schedules were not readily available, WASH has estimated remaining expenditures on the basis of the best available information.

1.3.3 The 1995 Targets

WASH targets for water and sanitation coverage to be attained by 1995, developed in the 1990 study, were extrapolated from a model that projects full coverage in each subsector of each country by the year 2020. Using this methodology, revised targets for Jamaica—reflecting revised coverage estimates—are developed in Chapter 2 of this report. For the four countries with unchanged percentage goals, the numbers of additional persons to be served have changed slightly as a result of population growth and advances in coverage made over the past year.

The WASH targets were not developed with country participation and do not reflect specific country goals. They are intended to assist A.I.D. in tracking the progress in water and sanitation service expansion, and focus attention on the magnitude of investment needed for raising coverage levels in these countries.

1.4 Methodology

The methodology used to determine the funding needed to achieve the targets established for 1995 follows the approach established in the previous updates.

- Using information from the USAID mission in each country, the report updates data on coverage for the four subsectors through the end of 1990.
- The total number of persons targeted for coverage in each subsector in 1995 is calculated by estimating the 1995 population through a simple linear extrapolation (i.e., by increasing the existing population at the current growth rate for a five-year period). The percentage goal for 1995 is then multiplied by the projected population to determine the size of the target population.
- The number of persons with access to services in each subsector in 1990 is then deducted from the number targeted for coverage in 1995 to provide an estimate of the population requiring additional water and sanitation services. For each subsector, the population target is then multiplied by the average per capita cost to estimate the total investment needed to attain WASH's objective.
- Finally, the funding shortfall is calculated by subtracting the total commitments for coverage-expanding projects in each subsector from the total investment needed to attain WASH's targets.

1.5 Report Organization

Chapter 2 of this report presents population and coverage data for the region and for each of the five countries. It also discusses progress toward attaining the 1995 WASH targets, foreign assistance commitments in each subsector, and funding shortfalls. Chapter 3 discusses the prospects for attaining these goals in each country and in the region. The country profile appendices that follow provide a more detailed analysis of the water and sanitation sector in each country. Each appendix contains tables and figures documenting actual water supply and sanitation coverage and the estimated investment required to meet the 1995 targets.

1.6 Additional Planning Reports

LAC plans to continue its annual updates of this Caribbean study through 1994. Reports on water and sanitation in the Andean countries of Bolivia, Ecuador, and Peru, as well as for Central America and Panama, are also available. These two regional reports will also be updated annually through 1994.

Chapter 2

WATER SUPPLY AND SANITATION UPDATE

2.1 Introduction

The coverage statistics provided in this report present a reasonably accurate picture of services available in each of the five countries. Much of the information was obtained directly by USAID missions and offices from national sources—water and sewerage agencies, coordinating committees, and census bureaus. In those instances where the reported coverage or population figures were not in conformity with the definitional framework of this report, WASH made adjustments using its best judgment. These adjustments are explained in the country profile appendices.

It is likely, however, that the data slightly exaggerate the number of persons with coverage. Estimates are usually developed by adding estimates of new facilities (connections to public systems and newly constructed wells, latrines, and other individual/private facilities) to data collected in a survey or census, and may include facilities that are not used by all potential users as well as facilities that have fallen into disrepair. Occasionally, reported estimates may include planned connections to public systems that have not yet been made. Despite these shortcomings, WASH believes the data approximate existing coverage and historical trends.

In comparing this update with the 1990 study, it must be noted that estimates of historical coverage for Grenada and Jamaica have been revised to incorporate updated information. As a result, 1989 data for the region differ slightly from those reported in the study.

2.2 Access to Water and Sanitation Services in 1990

In 1990, access to water supplies in the five countries ranged from a low of 39 percent in Haiti to a high of 100 percent in Barbados. Haiti also faced the most critical shortages in sanitation service coverage, with only 24 percent of its population having access to sanitary excreta disposal systems. Barbados, with 100 percent of its population covered, offered the greatest access to sanitation services. Current coverage figures for each country are provided in Tables 1 and 2 and are illustrated graphically in Figure 1.

Overall, in 1990 an estimated 61 percent of the 16 million inhabitants of the region had access to water services and 55 percent to sanitation, representing increases of 2 points and 4 points, respectively, since 1989, when the pilot study was published.

2.2.1 Urban vs. Rural Access

Throughout the region in 1990, 85 percent (6.5 million) of urban residents had access to water supplies and 76 percent (5.8 million) had access to sanitary excreta disposal (Figure 2, Tables 1 and 2). Since 1985, the baseline for this study, coverage in the urban water subsector has grown from 73 percent to 85 percent, and in the urban sanitation subsector from 67 percent to 76 percent, which means that more than 1.9 million have gained access to water and 1.5 million to sanitation. Despite heavy urbanization, gains in both subsectors have substantially exceeded population growth, which has amounted to 1.27 million (20 percent) in the past five years.

The rural population has been less favored. Water coverage remains about the same as in 1985, and sanitation coverage has declined substantially: the regional rural population with access to water has increased only from 38 percent to 39 percent, and with access to sanitation has declined from 43 percent to 35 percent. Between 1985 and 1990, the rural population of the region has grown by only 5 percent, or 420,000 persons. Consequently, the 1 percent gain for water coverage represents an increase of only 256,000 individuals. By contrast, gains in urban water supply service were more than seven times greater. During the same five-year period, access to sanitation services in rural areas was eroded by 441,000, while urban area gains were estimated at 1.5 million. As a result of this sluggish progress, the gap between urban and rural water coverage has grown from 35 points to 46 points, and urban sanitation coverage, which was 24 points higher than rural coverage in 1985, is now 41 points higher. Urban and rural coverage is contrasted graphically in Figure 3.

2.2.2 Water vs. Sanitation Advances

As indicated by these five-year trends, gains in sanitation services have lagged behind gains in access to water. Overall, sanitation services have expanded to cover an additional 1.1 million users, while water services now reach an additional 2.1 million. This disparity is most apparent in rural areas, where progress has focused on water supply services as a reflection of community priorities that rate the advantages of accessible water above the benefits of improved sanitation.

More recently, however, sanitation service development appears to be gaining momentum, outpacing water supply advances in the past year. A total of 782,000 persons (410,000 in urban areas, 372,000 in rural areas) gained access to sanitation services, while 563,000 (381,000 in urban areas, 182,000 in rural areas) gained access to water. This new impetus is in part a reflection of latrine-building projects, particularly in rural zones, as well as acceleration in connections to public sewerage systems.

2.2.3 Access by Country

The five countries of the region fall into two groups: Barbados, Grenada, and Jamaica have more than 80 percent coverage in each of the four subsectors; Haiti and the Dominican Republic, by contrast, have overall water coverage levels of 39 percent and 65 percent and sanitation coverage levels of 24 percent and 64 percent, respectively. The disparities in rural coverage are even greater.¹ Rural water coverage is 33 percent in Haiti and 27 percent in the Dominican Republic; rural sanitation coverage is 45 percent in Haiti and 43 percent in the Dominican Republic. Disparities in coverage among the five countries are shown in Figures 4 and 5.

2.3 1995 WASH Targets

The 1995 WASH targets are percentage goals for access to water and sanitation facilities among urban and rural populations in each country and will be affected by changes in population and advances in coverage. They are estimates of the progress required by 1995 if full coverage in both water and sanitation services is to be achieved by the year 2020. These targets do not necessarily reflect each country's current development plans for the sector. Targets for Jamaica have been revised to reflect updated coverage data obtained this year. With the incorporation of the new country goals, regional targets differ from those established in the original study.

Tables 3 and 4 show the targets for each country and for the region, and Figures 6 and 7 illustrate the difference between current coverage and coverage targets for each country. Regional targets for water coverage (Table 3) are 88 percent for urban areas, 51 percent for rural areas, and 69 percent for the total population. The sanitation goals (Table 4) are 45 percent for rural areas, 80 percent for urban areas, and 63 percent for both population groups. These targets seek to raise overall regional water coverage from 61 percent and sanitation coverage from 55 percent. Based on current population growth trends in each country, approximately 2.3 million additional persons will require access to water and 2.1 million to sanitation.

Tables 3 and 4 compare 1990 coverage with the coverage necessary to meet the 1995 targets for each subsector. The numbers of additional persons to be served in each country and in the region are shown in Table 5. The Dominican Republic, the most populous country in the region, will require the largest number of new facilities and connections—1,167,000 additional water connections and access for 1,039,000 additional persons to sanitation facilities. This is closely followed by Haiti's needs—water service for 957,000 individuals and sanitation service for 966,000.

¹ For the purposes of this report, the entire population of Grenada has been considered urban.

2.4 Funding Requirements

The levels of funding to meet the 1995 targets were determined by multiplying the estimated number of additional persons to be covered in each subsector in each country (Table 5) by the unit costs of providing services.² The estimate of total funding is shown in Table 6. Investment requirements for the region are shown graphically in Figure 8, which illustrates WASH's estimates of funding for each subsector. The estimate for urban water is nearly \$149 million and for rural water nearly \$71 million, making a total of \$219 million for water. The required commitment for sanitation is slightly smaller: a total of \$149 million, with \$122 million for urban coverage and \$27 million for rural areas. Overall, \$368.5 million is needed to attain the WASH targets for the region.

The disparity in investments to meet the urban and rural targets (\$271 million versus \$98 million) is partly a consequence of heavy urbanization but also a result of differences in unit costs. The average costs of \$131 and \$110 per person, respectively, for extending urban water and sanitation services contrast significantly with \$73 and \$54 per capita, respectively, for expanding rural services. Urban sewage and in-house water lines are more expensive than the simple latrines and wells fitted with handpumps in rural areas.

2.5 Funding Commitments and Shortfalls

The figures for committed funding shown in Table 6 include only that portion of external investments intended to extend coverage to persons currently unserved by basic water or sanitation services. A breakdown by donor of this commitment of approximately \$23 million is provided below.

A.I.D.	\$3,800,000
CARE	\$1,175,000
EEC	\$2,080,000
IDB	\$3,100,000
Italy	\$5,500,000
KfW	\$4,873,000
SSID	\$27,000
UNDP	\$40,000
UNICEF	\$100,000
World Bank	\$3,000,000
TOTAL	\$23,695,000

² Unit costs are based on figures developed by PAHO. These costs, which are expressed in U.S. dollars, have been increased each year by a small factor to account for inflation, and have been increased by 5 percent over figures used last year. Unit costs for each country are shown in Table 3 in the country profile appendices.

Since these figures exclude funding for activities that do not expand coverage, they do not show the relative importance of the IDB and the World Bank in financing the upgrading and rehabilitation of large municipal systems. Maintaining and improving these systems is critical for ensuring that services to densely populated urban areas does not deteriorate.

The additional investment needed to meet the 1995 regional targets in each subsector was determined by subtracting total commitments from total estimated costs (Figure 8).

Approximately \$369 million is needed to bring regional water and sanitation access to the prescribed levels (Table 6). Only about 6 percent—\$23 million—of this total and only 6 percent of the funding needed for urban development and 5 percent for rural zones have been committed. The overall shortfall exceeds \$345 million. Requirements for the four subsectors are: \$139 million for urban water; \$114 million for urban sanitation; \$66 million for rural water; and \$27 million for rural sanitation. Funding shortfalls for each country are presented in Figure 9. An average of \$69 million a year will be needed to meet the goals.

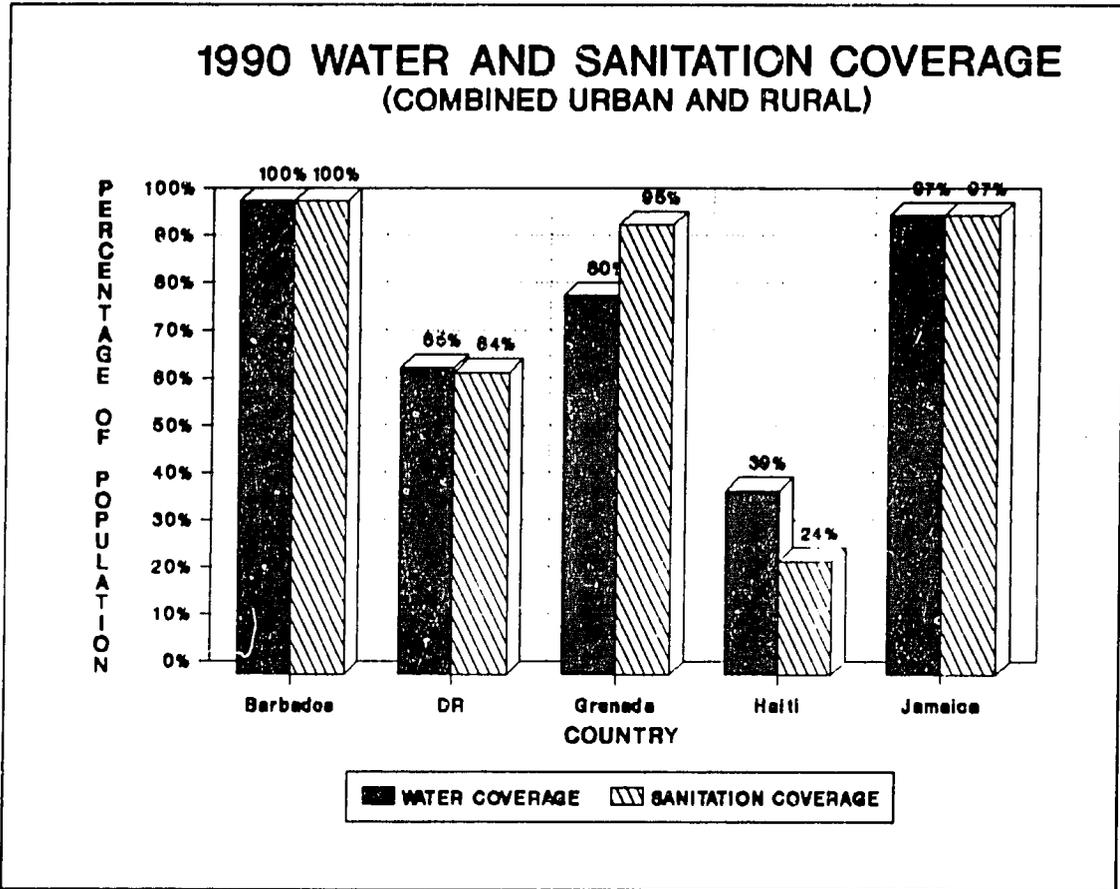


Figure 1

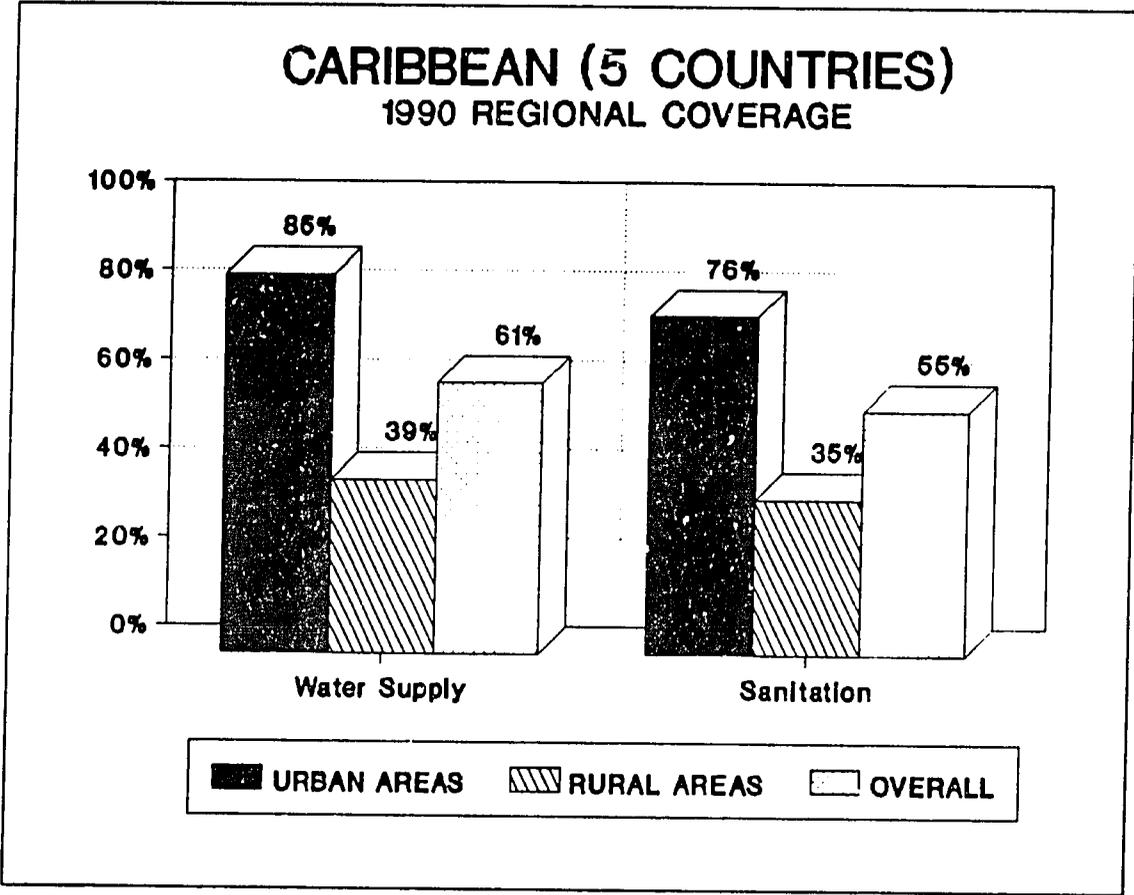


Figure 2

CARIBBEAN REGION

RURAL VS. URBAN COVERAGE 1985 AND 1990

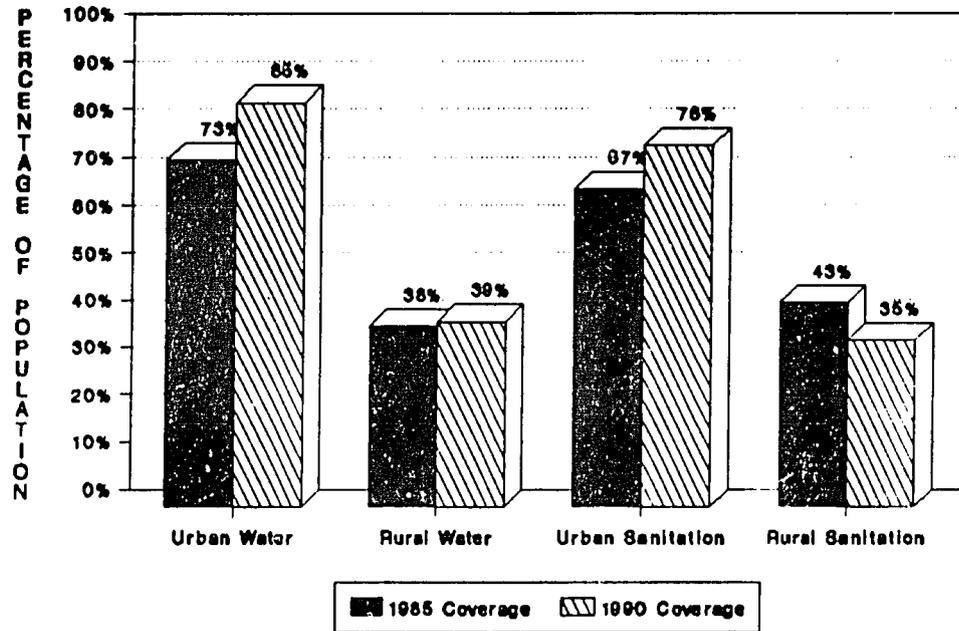


Figure 3

1985 AND 1990 WATER SUPPLY COVERAGE (COMBINED URBAN AND RURAL)

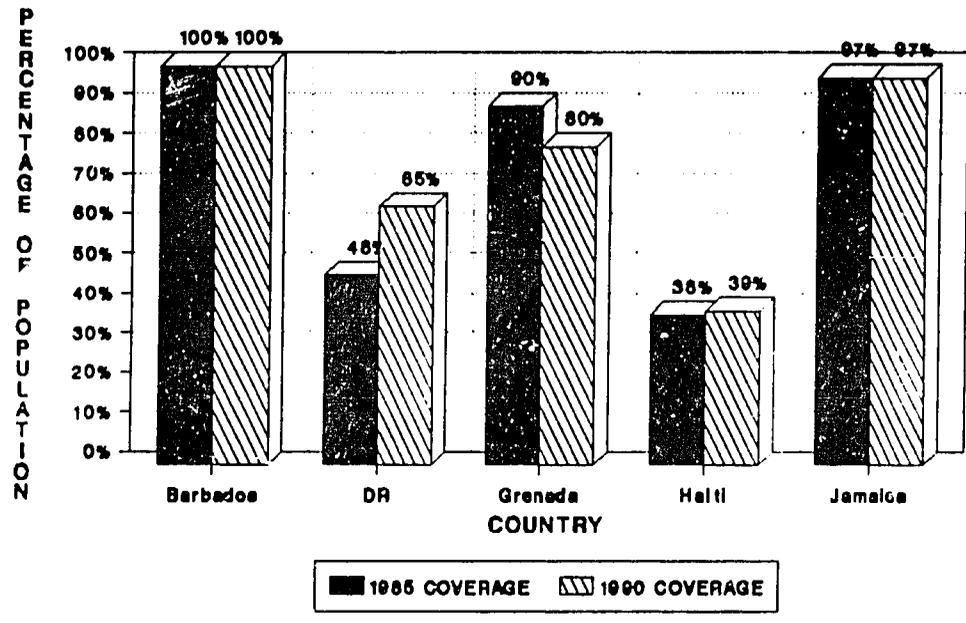


Figure 4

1985 AND 1990 SANITATION COVERAGE (COMBINED URBAN AND RURAL)

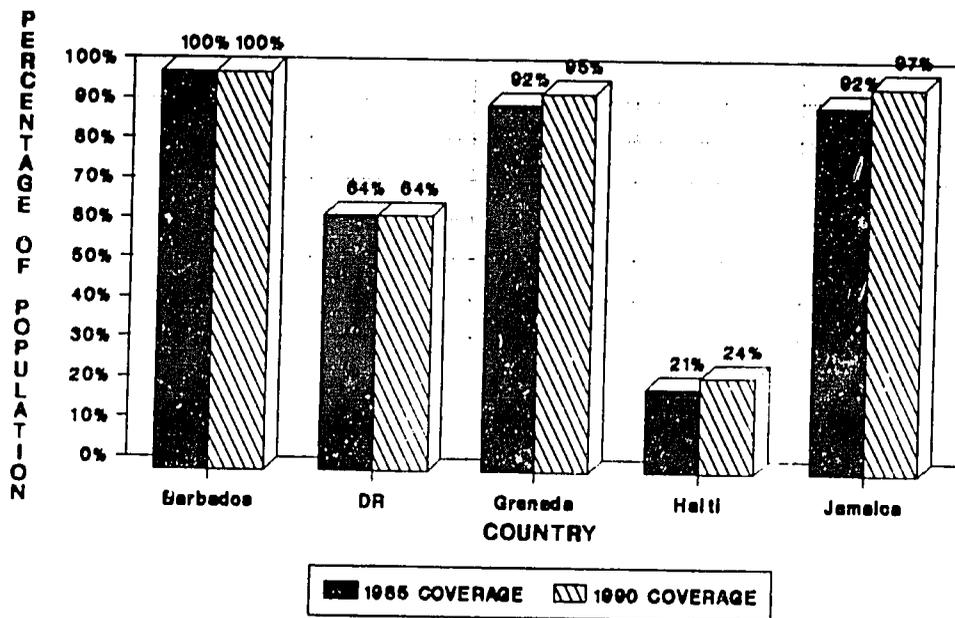


Figure 5

1990 WATER COVERAGE VS 1995 TARGETS (COMBINED URBAN AND RURAL)

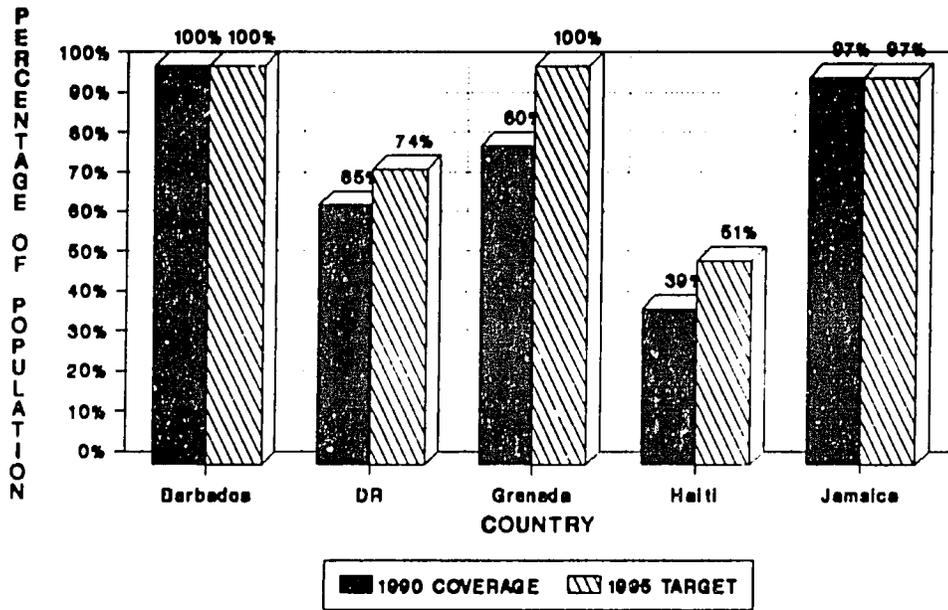


Figure 6

1990 SANITATION COVERAGE VS 1995 TARGETS (COMBINED URBAN AND RURAL)

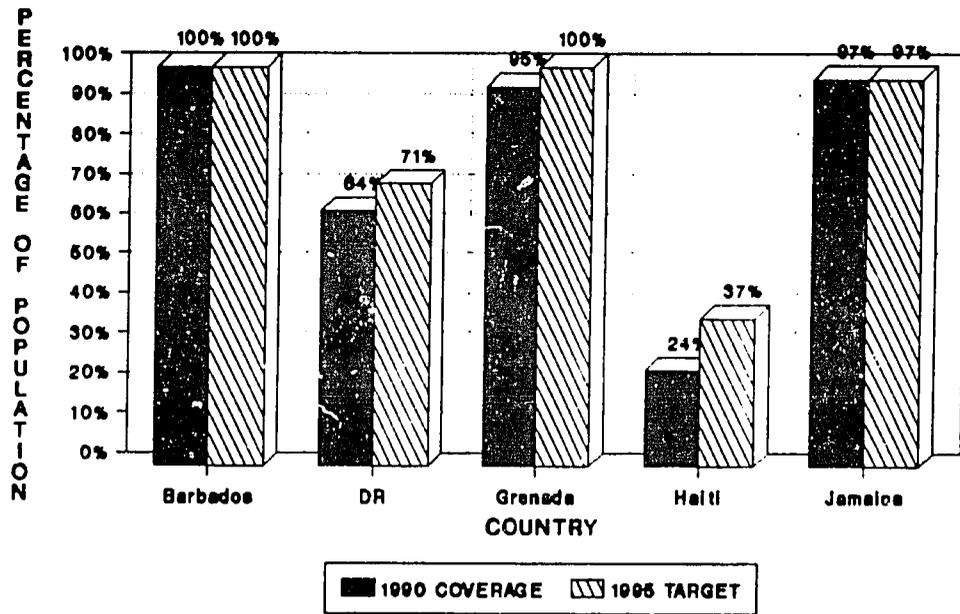


Figure 7

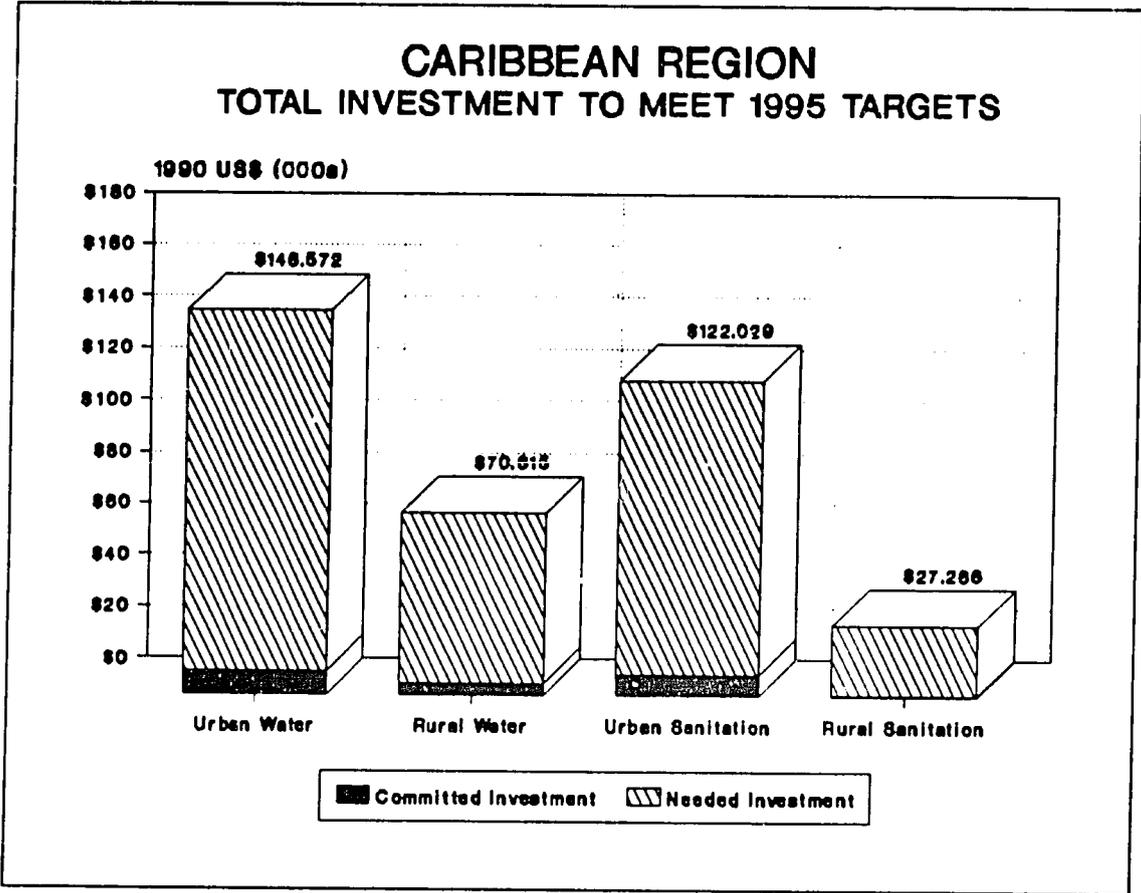


Figure 8

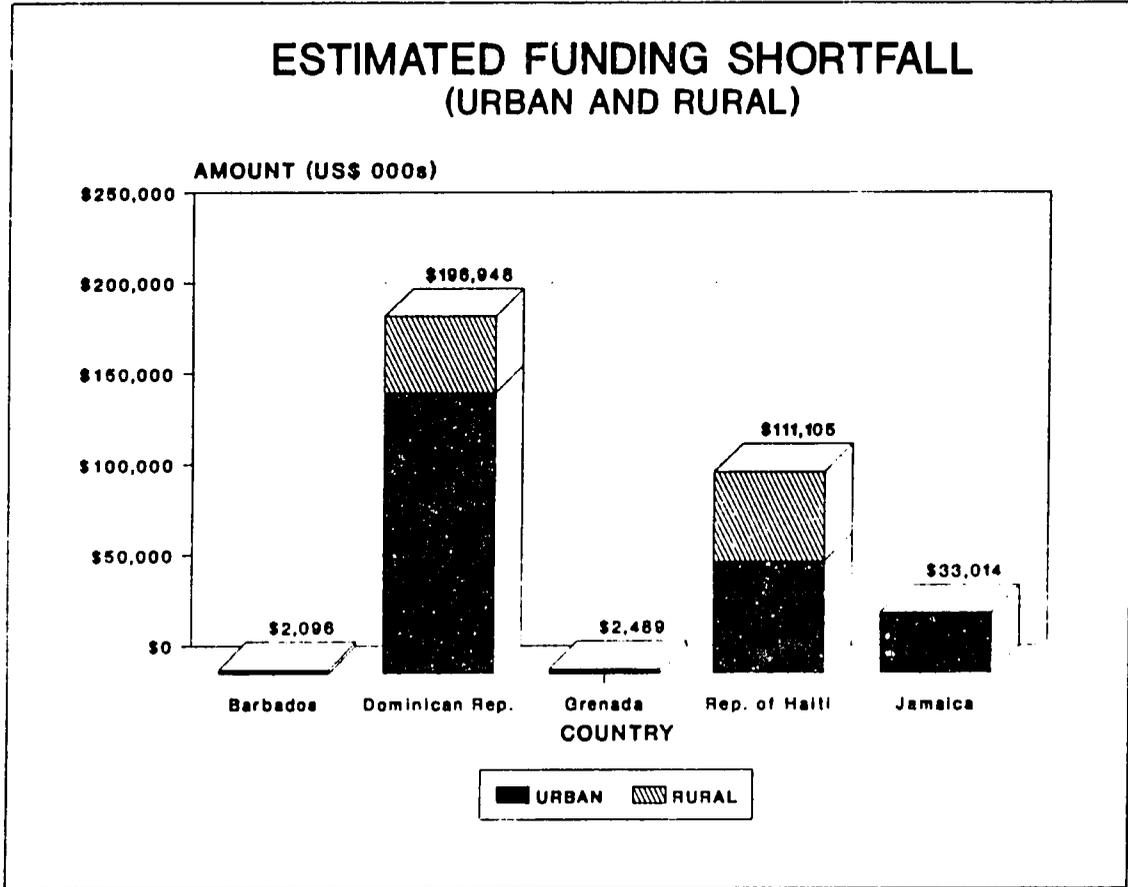


Figure 9

TABLE 1

Water Supply Coverage: 1980 and 1990 Coverage Levels

WATER SUPPLY										
COUNTRY	YEAR	TOTAL POPUL.	ALL AREAS		URBAN AREAS			RURAL AREAS		
			POPUL. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POPUL. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POPUL. SERVED	% OF POP. SERVED
BARBADOS	1985	253	252	100%	107	107	100%	146	145	99%
	1989	254	254	100%	112	112	100%	142	142	100%
	1990	254	254	100%	112	112	100%	142	142	100%
DOMINICAN REP.	1985	6,416	3,097	48%	3,498	2,363	68%	2,918	734	25%
	1989	7,019	4,416	63%	4,065	3,618	89%	2,954	798	27%
	1990	7,250	4,746	65%	4,274	3,932	92%	2,976	814	27%
GRENADA	1985	94	77	82%	94	77	82%	N/A	N/A	N/A
	1989	95	76	80%	95	76	80%	N/A	N/A	N/A
	1990	95	76	80%	95	76	80%	N/A	N/A	N/A
HAITI	1985	5,269	1,992	38%	1,405	826	59%	3,864	1,166	30%
	1989	5,866	2,123	36%	1,600	870	54%	4,266	1,253	29%
	1990	5,960	2,330	39%	1,670	920	55%	4,290	1,410	33%
JAMAICA	1985	2,326	2,248	97%	1,233	1,221	99%	1,093	1,027	94%
	1989	2,466	2,381	97%	1,464	1,449	99%	1,002	932	93%
	1990	2,493	2,407	97%	1,481	1,466	99%	1,012	941	93%
TOTAL	1985	14,358	7,666	53%	6,337	4,594	72%	8,021	3,072	38%
	1989	15,700	9,250	59%	7,336	6,125	83%	8,364	3,125	37%
	1990	16,052	9,813	61%	7,632	6,506	85%	8,420	3,307	39%

Population figures are rounded to the nearest thousand.

TABLE 2

Sanitation Coverage: 1980 and 1990 Coverage Levels

SANITATION										
COUNTRY	YEAR	TOTAL POPUL.	ALL AREAS		URBAN AREAS			RURAL AREAS		
			POPUL. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POPUL. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POPUL. SERVED	% OF POP. SERVED
BARBADOS	1985	253	253	100%	107	107	100%	146	146	100%
	1989	254	254	100%	112	112	100%	142	142	100%
	1990	254	254	100%	112	112	100%	142	142	100%
DOMINICAN REP.	1985	6,416	4,101	64%	3,498	2,325	66%	2,918	1,776	61%
	1989	7,019	4,215	60%	4,065	3,211	79%	2,954	1,004	34%
	1990	7,250	4,630	64%	4,274	3,433	80%	2,976	1,197	40%
GRENADA	1985	94	79	84%	94	79	84%	N/A	N/A	N/A
	1989	95	90	95%	95	90	95%	N/A	N/A	N/A
	1990	95	90	95%	95	90	95%	N/A	N/A	N/A
HAITI	1985	5,269	1,107	21%	1,405	592	42%	3,864	515	13%
	1989	5,866	1,127	19%	1,600	607	38%	4,266	520	12%
	1990	5,960	1,410	24%	1,670	720	43%	4,290	690	16%
JAMAICA	1985	2,326	2,142	92%	1,233	1,147	93%	1,093	995	91%
	1989	2,466	2,323	94%	1,464	1,391	95%	1,002	932	93%
	1990	2,493	2,407	97%	1,481	1,466	99%	1,012	941	93%
TOTAL	1985	14,358	7,682	54%	6,337	4,250	67%	8,021	3,432	43%
	1989	15,700	8,009	51%	7,336	5,411	74%	8,364	2,598	31%
	1990	16,052	8,791	55%	7,632	5,821	76%	8,420	2,970	35%

Population figures are rounded to the nearest thousand.

TABLE 3

Water Supply Coverage: 1990 Coverage Levels vs. 1995 Targets

WATER SUPPLY										
COUNTRY	YEAR	TOTAL POPUL.	ALL AREAS		URBAN AREAS			RURAL AREAS		
			POPUL. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POPUL. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POPUL. SERVED	% OF POP. SERVED
BARBADOS	1990	254	254	100%	112	112	100%	142	142	100%
	1995	261	261	100%	120	120	100%	142	142	100%
DOMINICAN REP.	1990	7,250	4,746	65%	4,274	3,932	92%	2,976	814	27%
	1995	7,991	5,913	74%	4,955	4,608	93%	3,036	1,305	43%
GRENADA	1990	95	76	80%	95	76	80%	N/A	N/A	N/A
	1995	95	95	100%	95	95	100%	N/A	N/A	N/A
HAITI	1990	5,960	2,330	39%	1,670	920	55%	4,290	1,410	33%
	1995	6,465	3,287	51%	1,985	1,271	64%	4,480	2,016	45%
JAMAICA	1990	2,493	2,407	97%	1,481	1,466	99%	1,012	941	93%
	1995	2,606	2,531	97%	1,619	1,603	99%	987	928	94%
TOTAL	1990	16,052	9,813	61%	7,632	6,506	85%	8,420	3,307	39%
	1995	17,418	12,087	69%	8,774	7,697	88%	8,645	4,391	51%

Population figures are rounded to the nearest thousand.

TABLE 4

Sanitation Coverage: 1990 Coverage Levels vs. 1995 Targets

SANITATION										
COUNTRY	YEAR	TOTAL POPUL	ALL AREAS		URBAN AREAS			RURAL AREAS		
			POPUL SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POPUL SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POPUL SERVED	% OF POP. SERVED
BARBADOS	1990	254	254	100%	112	112	100%	142	142	100%
	1995	261	261	100%	120	120	100%	142	142	100%
DOMINICAN REP.	1990	7,250	4,630	64%	4,274	3,433	80%	2,976	1,197	40%
	1995	7,991	5,669	71%	4,955	4,212	85%	3,036	1,457	48%
GRENADA	1990	95	90	95%	95	90	95%	N/A	N/A	N/A
	1995	95	95	100%	95	95	100%	N/A	N/A	N/A
HAITI	1990	5,960	1,410	24%	1,670	720	43%	4,290	690	16%
	1995	6,465	2,376	37%	1,985	1,032	52%	4,480	1,344	30%
JAMAICA	1990	2,493	2,407	97%	1,481	1,466	99%	1,012	941	93%
	1995	2,606	2,531	97%	1,619	1,603	99%	987	928	94%
TOTAL	1990	16,052	8,791	55%	7,632	5,821	76%	8,420	2,970	35%
	1995	17,418	10,932	63%	8,774	7,062	80%	8,645	3,871	45%

Population figures are rounded to the nearest thousand.

TABLE 5

Increase Over 1990 Coverage Levels Required to Meet 1995 Targets
(Number of Persons to be Served—000s)

COUNTRY	WATER SUPPLY			SANITATION		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
BARBADOS	8	8	0	8	8	0
DOMINICAN REP.	1,167	676	491	1,039	779	260
GRENADA	19	19	0	5	5	0
HAITI	957	351	606	966	312	654
JAMAICA	137	137	0	137	137	0
TOTAL	2,288	1,191	1,097	2,155	1,241	914

Population figures are rounded to the nearest thousand.

TABLE 6

**Estimated Funding Needed to Meet 1995 Targets
(1990 US \$000s)**

COUNTRY	WATER SUPPLY			SANITATION			TOTAL
	SUBTOTAL	URBAN	RURAL	SUBTOTAL	URBAN	RURAL	
BARBADOS--MEET 1995 GOALS	\$1,048	1,048	0	1,048	1,048	0	2,096
COMMITTED FUNDING	\$0	0	0	0	0	0	0
REQUIRED INVESTMENT	\$1,048	1,048	0	1,048	1,048	0	2,096
DOMINICAN REP.--MEET 1995 GOALS	\$107,193	72,332	34,861	96,347	88,027	8,320	203,540
COMMITTED FUNDING	\$3,372	2,809	563	3,220	2,966	254	6,592
REQUIRED INVESTMENT	\$103,821	69,523	34,298	93,127	85,061	8,066	196,948
GRENADA--MEET 1995 GOALS	\$2,489	2,489	0	655	655	0	3,144
COMMITTED FUNDING	\$0	0	0	1,500	1,500	0	1,500
REQUIRED INVESTMENT	\$2,489	2,489	0	0	0	0	2,489
HAITI--MEET 1995 GOALS	\$90,510	54,756	35,754	33,318	14,352	18,966	123,828
COMMITTED FUNDING	\$9,236	4,815	4,421	3,487	3,083	404	12,723
REQUIRED INVESTMENT	\$81,274	49,941	31,333	29,831	11,269	18,562	111,105
JAMAICA--MEET 1995 GOALS	\$17,947	17,947	0	17,947	17,947	0	35,894
COMMITTED FUNDING	\$1,590	1,590	0	1,290	1,290	0	2,880
REQUIRED INVESTMENT	\$16,357	16,357	0	16,657	16,657	0	33,014
TOTAL TO MEET 1995 GOALS	\$219,187	148,572	70,615	149,315	122,029	27,286	368,502
* COMMITTED FUNDING	\$14,198	9,214	4,984	8,652	7,994	658	22,850
REQUIRED INVESTMENT	\$204,989	139,358	65,631	140,663	114,035	26,628	345,652

* Committed funding for each country and for the region excludes "excess" funding beyond the amount required to meet WASH goals.

TABLE 7

**Estimated Funding Shortfall to Meet 1995 Targets
(1990 US \$000s)**

COUNTRY	URBAN AREAS			RURAL AREAS			OVERALL
	SUBTOTAL	WATER	SANITATION	SUBTOTAL	WATER	SANITATION	
BARBADOS	\$2,096	1,048	1,048	0	0	0	2,096
DOMINICAN REP.	\$154,584	69,523	85,061	42,364	34,298	8,066	196,948
GRENADA	\$2,489	2,489	0	0	0	0	2,489
HAITI	\$61,210	49,941	11,269	49,895	31,333	18,562	111,105
JAMAICA	\$33,014	16,357	16,657	0	0	0	33,014
TOTAL	\$253,393	139,358	114,035	92,259	65,631	26,628	345,652

Chapter 3

CONCLUSIONS

3.1 Introduction

The prospects for meeting the 1995 goals vary substantially from country to country because of differences in both current levels of water and sanitation coverage and the funding committed to expanding coverage. Several countries need relatively small investments but face shortfalls if these investments are not made.³ This chapter discusses the required increases in coverage for each country and the funding to meet these targets.

3.2 Meeting the 1995 Country Targets

3.2.1 Barbados

With 100 percent coverage in both water and sanitation services, Barbados's objectives are to maintain this level of coverage and to improve services. Because of its small population (254,000 in 1990) and low growth rates, maintaining full coverage translates into providing services to approximately 5,000 additional persons by 1995. At present, Barbados has no committed external assistance in the sector; however, one large IDB loan for the development of sewerage lines is pending approval. WASH has estimated that only \$2.1 million is needed to maintain full coverage—a relatively small amount and the lowest in the region. Thus, even without substantial external assistance, the Barbadian government should be able to achieve the WASH targets.

However, as important as maintaining full coverage is the need for the GOB to improve the existing sanitation network. The widespread use of private septic tanks and absorption pits, and inadequate waste disposal within the public system, pose a serious environmental threat. The small size of the island, the dense population (588/sq.km), and the importance of tourism make sound waste management an urgent necessity. The IDB loan will address this need.

3.2.2 Dominican Republic

The Dominican Republic, the most populous in the region, must implement the largest increases in coverage to meet the WASH targets, which call for water service to 1.2 million persons and sanitation service to 1 million. The percentage increases are relatively small:

³ This analysis includes only external donations and national counterpart funding for externally financed projects.

1 percent in urban water supply and 5 percent in sanitation to meet the 1995 goals of 93 percent and 85 percent, respectively. With heavy urbanization and high population growth rates, however, these goals correspond to increases of 676,000 in water and 779,000 in sanitation. The percentage targets for rural areas are larger: 16 percent growth in water coverage (to 43 percent) and 8 percent in sanitation services (to 48 percent). With current population trends, this will mean providing water service to 491,000 and sanitation service to 260,000 individuals.

The Dominican Republic requires the largest sectoral investment—\$204 million, or more than half the regional total, according to WASH's calculations. Less than \$7 million of this has been committed, leaving a deficit of \$197 million. Supplemental foreign assistance is clearly vital to efforts to develop the sector.

More than 75 percent of this assistance will support urban sector development, reflecting current funding commitments of 87 percent to urban locales. Urban assistance is critical for a number of reasons, including serious industrial and residential waste pollution, and the constant strain on existing resources imposed by continuing urbanization. But the rural areas, which suffer from similar health and environmental problems, should not be neglected in future sectoral development. The 1995 targets for rural zones are disturbingly low—below 50 percent.

Insanitary conditions on the island contribute significantly to poor health. Infectious intestinal diseases, primarily diarrhea, are the principal cause of child mortality, recently estimated at 84/1,000 (more than four times that in Barbados). If the populace is to enjoy the benefits of improved coverage, investments beyond the levels set for the five-year goals must be committed.

3.2.3 Grenada

With Grenada's current coverage levels of 80 percent in water and 95 percent in sanitation, WASH's objective of full coverage by 1995 requires relatively modest service expansion in a country of small size (86,000 inhabitants). In the water sector, 19,000 more persons, and in sanitation, 5,000 more persons must be served. Of the total of \$3.1 million required, \$2.5 million for the provision of water services is outstanding. (More funding than is necessary to meet WASH's sanitation targets has been committed.) CIDA's plans to invest as much as \$11 million in the sector should help to reduce the water development deficit.

3.2.4 Haiti

Poor water and sanitation facilities are a significant cause of the high morbidity and mortality rates from infectious and parasitic diseases. Coverage estimates for 1990 indicate that only 39 percent of Haiti's 5.9 million residents have adequate access to water and only 24 percent to sanitation facilities. The political and financial instability that continues to plague

Haiti will make it difficult to attain the WASH targets for substantial increases in coverage. In the urban sector, these increases are from 55 percent to 64 percent of the population for water and from 43 percent to 52 percent for sanitation. In the rural sector, water coverage is to increase from 33 percent to 45 percent, and sanitation coverage from 16 percent to 30 percent. In numbers this means adequate water access for an additional 351,000 urban and 606,000 rural dwellers, a total of 957,000 persons, and sanitation facilities for an additional 312,000 urban and 654,000 rural inhabitants, a total of 966,000 individuals.

Haiti has the largest pool of committed external financing to expand water and sanitation services yet faces the second largest deficit. Of \$124 million to meet the 1995 targets, \$13 million has been committed, leaving a deficit of \$111 million. Additional foreign assistance to the sector is anticipated from a number of donor agencies, including CIDA, the IDB, KfW, UNICEF, and the World Bank. But it is doubtful that Haiti will get as much as \$111 million solely for expanding services in the next five years.

3.2.5 Jamaica

Jamaica's current coverage levels of 97 percent in both water and sanitation are the second highest in the region, slightly behind those of Barbados. Adequate water and sanitation services are available to 99 percent of the urban and 93 percent of the rural population. At the current rate of population growth, the 1995 targets, which seek to maintain islandwide coverage at 97 percent, require no change in urban levels and an increase of only one point, to 94 percent, in rural coverage. In numbers of people this means urban services for an additional 137,000 but, as a result of an anticipated decline in the rural population, no increase in rural coverage.

Overall, Jamaica will require additional investments of approximately \$36 million, of which only \$2.9 million has been committed. However, anticipated financing from A.I.D., JICA, the IDB, and the World Bank may help to offset the shortfall of \$33 million. As in Barbados and Grenada, there is an urgent need to upgrade and rehabilitate existing facilities to raise environmental standards. Because its water resources are strained by groundwater pollution, droughts, and losses from aging equipment, Jamaica must emphasize improved water service delivery and accountability.

3.3 Regional Summary

Each of the nations in this study faces substantial challenges in attaining the 1995 coverage targets. Of more than \$368 million required for the region, only \$22 million has been committed. To eliminate the deficit of \$346 million, approximately \$69 million a year must be committed over the next five years.⁴

The two poorest countries in the region, Haiti and the Dominican Republic, face the most critical funding shortages, accounting for more than 75 percent of the total deficit with shortfalls of nearly \$112 million and \$197 million, respectively. They desperately need assistance in extending basic services, whereas Barbados, Grenada, and Jamaica must focus on upgrading and rehabilitating existing services to improve environmental conditions.

Although external commitments are concentrated in urban zones, with only 22 percent of the \$22 million directed to rural areas, deficits for urban areas are significantly greater, accounting for 73 percent of the total shortfall. By subsector, the additional investments needed are: \$139 million for urban water; \$114 million for urban sanitation; \$66 million for rural water; and \$27 million for rural sanitation (Table 7). The larger urban investment needs are explained by two factors: increasing urbanization, and the higher costs of urban facilities.

In each of the four countries with less than full coverage, coverage in rural zones is lower than that in urban centers and will continue to lag under the 1995 targets. Urban development generally is given priority for reasons ranging from greater industrial pollution and dense populations to political necessity and tourism. But the impact of insanitary conditions on health is often more severe in rural regions, which frequently lack even basic health care services. Yet, as funding patterns in Haiti, the poorest country, show, investment is heavily skewed to urban development and not related to needs. This imbalance must be corrected as a matter of high priority if the rural populations are to advance toward parity.

A.I.D., the IDB, KfW, and the World Bank have played a significant role in expanding water and sanitation services in the region. Financing for activities in municipal areas has come primarily from the IDB and the World Bank; rural development has been supported mainly by A.I.D. and KfW. Urban sector development has been directed largely to rehabilitation and upgrading rather than service expansion, whereas rural development has focused on expanding services.

Water and sanitation projects generally involve both local and external financing, but growing inflation, indebtedness, and other financial difficulties have greatly curtailed local investment in the sector. A.I.D.'s projects normally are financed with Development Assistance (DA) funds, or, in urban areas, through the Housing Guarantee (HG) program, often with the

⁴ Grenada has more funding than it needs to meet the targets for sanitation development. But this excess has not been reallocated and does not reduce the regional deficit.

expectation of counterpart contributions. Because of the dearth of local funds, however, A.I.D. has in some cases financed the local component through the Economic Support Fund (ESF) and may also assist countries with local capital formation for future investments in the sector.

3.4 WASH's Lessons Learned

This report has focused on the importance of constructing facilities to increase access to water supplies and sanitary excreta disposal. However, in its work over the past 10 years, WASH has realized that the problems do not end once these facilities are in place.

In rural communities, particularly in Haiti and the Dominican Republic, where diarrheal and intestinal diseases contribute significantly to infant and child mortality and morbidity, health and hygiene education is a vital element of water and sanitation activities. Environmental education is no less important in urban areas, where pollution from various sources is becoming increasingly problematic. Appropriate solutions for solid waste and industrial waste disposal must be found to ensure that urban water supplies are potable.

It is not sufficient merely to provide funding to local institutions, which often lack the capacity to absorb it. Training in maintenance and operations is essential to sustain water supply and sanitation facilities. Information systems, planning, and the reduction of unaccounted for water in urban systems are other areas to be improved. Many countries in the region that have relied heavily on loans from the IDB and the World Bank face difficulties in repaying them. These nations must seek alternative methods of financing, including donations and cost-recovery or tariff schemes. The development and transfer of inexpensive appropriate technologies is necessary so that systems that can be efficiently installed and maintained are adapted to local conditions.

National and community-level participation in planning, execution, and maintenance is the best guarantee for the success of water and sanitation programs. In addition, there should be a greater role for the private sector in areas such as system maintenance and operation, financing, project design, construction, and the provision of materials and supplies.

Water and sanitation goals require substantial resources, and these investments will be most productive when the various agencies, institutions, and communities involved can form partnerships at both the policy and operational levels, and can make a long-term commitment to build the systems and maintain them.

INTRODUCTION TO THE APPENDICES

The status of water and sanitation coverage in each of the five Caribbean countries is examined in the following appendices. Each country profile describes current and proposed externally funded projects, current coverage levels, the 1995 WASH targets for each subsector, and the investment required to attain the goals. The appendices also provide health, economic, and social indicators and a brief overview of socioeconomic and health conditions.

DATA SOURCES

General background information on each country was drawn primarily from PAHO's 1990 Health Conditions in the Americas. Other data were obtained from the following sources:

Population

Population data, including urban/rural breakdowns and current growth rates, were provided by the USAID missions and obtained from national statistics and census or planning offices, with the following exception: population growth rates for Barbados and Jamaica were obtained from the World Bank's Social Indicators of Development, 1990.

Population estimates for 1995 were obtained by extrapolating current populations, using the growth rates provided.

Infant and Under 5 Mortality Rates

These figures were provided by A.I.D.'s Center for International Health Information; they represent the most current values for selected indicators as maintained by CIHI.

Infant Mortality Rate: The estimated number of deaths in infants (children under age one) in a given year per 1,000 live births in that same year. An IMR may be calculated by direct methods (counting births and deaths) or by indirect methods (applying well-established demographic models.)

Under 5 Mortality: The estimated number of children born in a given year who will die before reaching age 5 per thousand live births in that same year. The under 5 mortality may also be calculated by direct or indirect methods.

Mortality Rate due to Infectious/Parasitic Diseases and Diarrheal/Intestinal Diseases

This information, obtained from PAHO's 1990 Health Conditions in the Americas, represents the number of deaths from these diseases per 100,000 persons.

Life Expectancy, Adult Literacy, GNP per Capita, GNP Growth Rate, and Inflation

These figures are primarily from the 1990 World Development Report published by the World Bank. Life expectancy data for Barbados and Grenada were obtained from Social Indicators of Development, 1990. Literacy rates for Grenada were obtained from RDO/C and are based on PAHO data; the rate for Jamaica was provided by USAID/Jamaica.

Currency Exchange Rates

Foreign exchange rates were obtained from the Wall Street Journal of April 15, 1990.

Estimated per Capita Costs for Construction of Facilities

Data on unit costs for the construction of water supply and sanitation facilities are based on data provided by PAHO. Unit costs are based on a 5 percent cost increase over the estimates used in the 1990 study.

TABLES AND FIGURES

Each profile includes a number of tables and figures that document the coverage and investment data discussed in the main text. They appear at the end of each appendix in the following order:

Actual Water Supply Coverage vs. 1995 Targets

Table 1 provides historical data on water supply coverage in urban and rural areas for selected years from 1980 to 1990 and the WASH targets for 1995. Coverage is shown in terms of the number of individuals and the percentage of the population with access to water services.

Actual Sanitation Coverage vs. 1995 Targets

Table 2 provides historical data on sanitation coverage and the WASH goals for 1995. As in Table 1, coverage is shown in terms of percentages and numbers of persons.

Urban and Rural Water Supply Coverage

Figure 1 tracks water supply coverage in urban and rural areas by percentage from 1985 to 1990.

Urban and Rural Sanitation Coverage

Figure 2 charts data for sanitation in the same format as Figure 1.

Investment Needed to Meet 1995 Targets

Table 3 presents an estimate of the investment needed to attain the WASH objectives for 1995, as well as the projected investment shortfall. This table also provides the data from which the investment requirement is calculated. The number of persons to be covered by 1995 was multiplied by the per capita costs of constructing water and sanitation facilities to determine the total investment needed. Firmly committed investments to expand coverage were deducted from this figure to estimate the funding shortfall. Figure 3 provides a visual reference. The shaded portion represents current commitments and the patterned portion shows the shortfall.

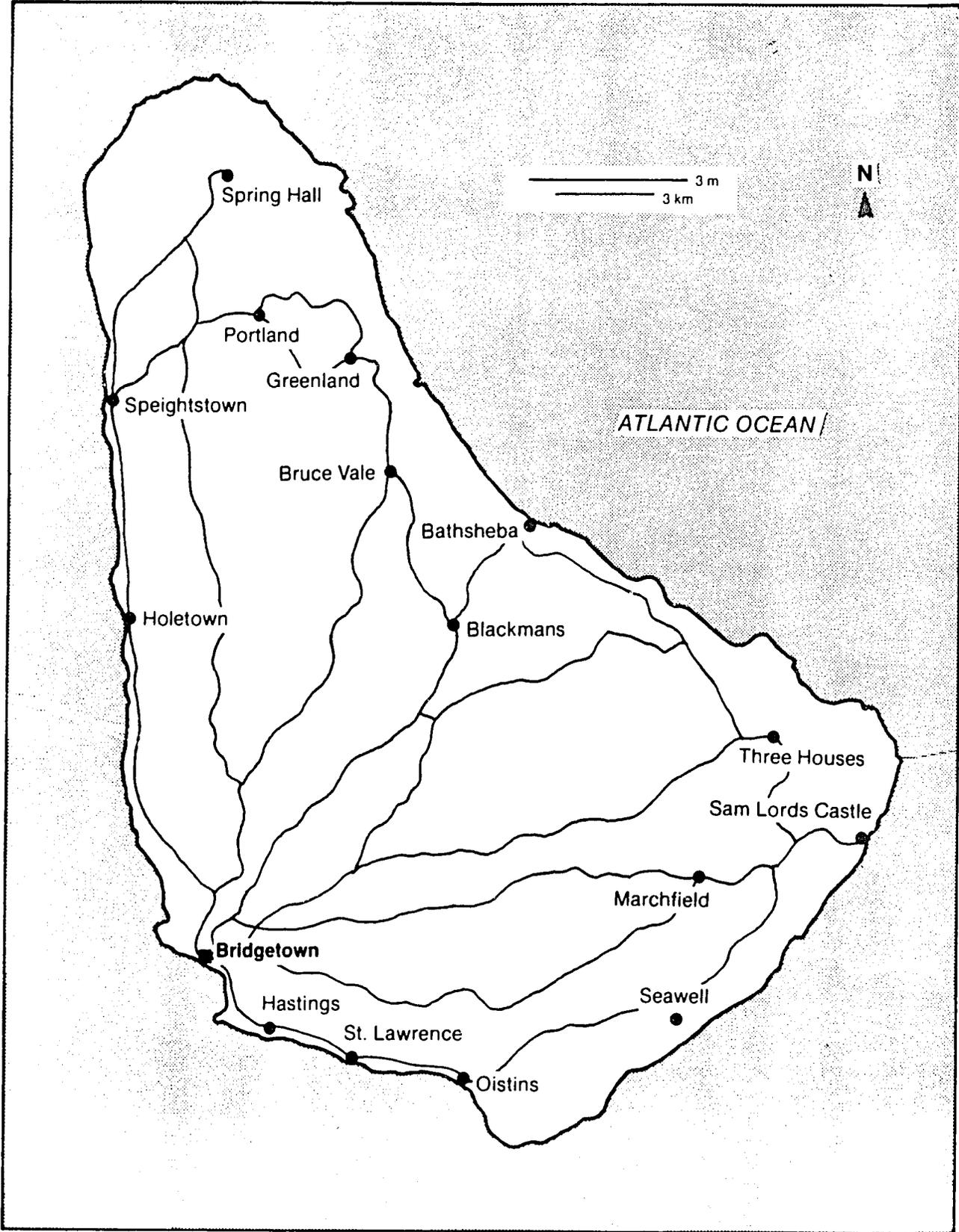
1990 Coverage vs. 1995 Targets (Percentage of Population with Coverage)

Figure 4 compares WASH's 1995 targets, expressed as percentage goals, with the current (1990) percentage of each country's population that has water and sanitation coverage.

1990 Coverage vs. 1995 Targets (Number of Persons with Coverage)

Figure 5 compares the number of persons who currently have access to water and sanitation services with the number required to meet the 1995 targets.

BARBADOS



APPENDIX A

BARBADOS

COUNTRY BACKGROUND

The island of Barbados covers 432 square kilometers and has approximately 254,000 inhabitants. The Barbadian economy is based primarily on agriculture, light manufacturing, tourism, and services. Barbados has the highest per capita GNP in the region, but with mounting external debt (more than US\$1.1 billion in 1987) and rising unemployment (22.9 percent in 1987), it is struggling to maintain a positive growth rate. Recently, the manufacturing sector has declined as a result of increasing competition as well as economic pressures within the Caribbean which have spawned a contraction in regional trade. Although the services and tourism sectors have continued to expand, Barbados's balance of trade has remained negative in recent years.

COUNTRY PROFILE	
1990 Population:	254,000 Urban: 112,000 Rural: 142,000
Population Growth Rate:	Rural: -6% Urban: 1.3%
Infant Mortality Rate:	10.5
Under 5 Mortality Rate:	13
Mortality Rate due to Infectious and Parasitic Diseases:	19.8
Mortality Rate due to Diarrheal Diseases:	N/A
Life Expectancy:	Female: 77.3 Overall: 74.8
Adult Literacy Rate:	N/A
GNP per Capita (1988):	\$6,010
GNP per Capita (1989):	\$6,370
GNP per Capita Annual Growth from 1965-88:	2.3%
Currency:	Dollars 2.01 = \$1
Average Annual Inflation from 1980-88:	6.1%

As illustrated by the indicators for mortality and life expectancy, the health status of Barbadians is relatively good. The leading causes of mortality are heart and cerebrovascular diseases, the results of hypertension, followed by diabetes; the major concern in child health is neonatal mortality. Infectious and parasitic diseases, often linked to unhygienic conditions, are not widespread. The entire population has adequate access to water supplies and at least basic sanitation facilities.

Protection of the environment is particularly important in Barbados because of its small size, high population density, and profitable tourist industry. There is widespread use of septic tanks and absorption pits that pollute groundwater, particularly problematic for an island that relies heavily on underground water resources. To address this problem, the Barbadian government is expanding on-site sewerage connections. It also faces challenges from the pollution of coastal waters by raw sewage and from the degradation of the coastline.

The Barbados Water Authority and the Land and Water Use Unit of the Ministry of Agriculture are responsible for water and sanitation activities on the island.

COVERAGE LEVELS AND INVESTMENT

Current Projects

With 100 percent coverage in all four subsectors, low population growth, and a relatively healthy economy, Barbados has received little external assistance in the water and sanitation sector in recent years. Despite high coverage rates, however, improvements in the existing network of water and sewerage facilities are critical for environmental protection. A project jointly funded by the IDB and two partners and planned for start-up in 1991 aims to upgrade commercial and residential waste disposal systems.

- **IDB**

The South Coast Sewerage Project was first proposed in a 1982 master plan for the island that recommended sewerage development in three areas: the South Coast; the West Coast; and the greater Bridgetown area. Updated studies and designs for the project, which has been in the planning stage for more than two years, should be completed by August 1991. Start-up has been delayed pending the government's compliance with contractual obligations set forth under the IDB-funded Central Bridgetown Water and Sanitation Project. This project, which ended in 1984, involved the construction of new sewers, a treatment plant, a pumping station, an outfall to the sea, and additional water and sewerage connections, primarily to commercial sites. The South Coast project will not be approved until the government has made sufficient progress in installing additional connections to residential sites.

The four-year South Coast project is expected to be financed by a \$45 million loan from the IDB, \$6.6 million from the Caribbean Development Bank and the European Investment Bank, and \$13 million from the GOB. In addition to installing house connections, the project will construct pumping stations, transmission lines, treatment plants, and an outfall to the sea. A public sewerage system will replace the existing network of private septic tanks, dry pits, and suck wells, and will be operated and maintained by revenues from cost-recovery mechanisms. Because the project awaits approval, it has not been included in the investment analysis.

A second prospective IDB project, covering construction of solid waste systems, is in the pre-feasibility study stage. A 15-month study, beginning in mid-1991, will determine the best method for long-term solid waste management. Two options, landfills and incineration, will be investigated. The IDB will consider financing construction after the completion of the study.

Total funding committed to increase coverage: \$0

Current Coverage

In addition to current statistics, RDO/C has provided the updated coverage estimates for 1989 incorporated in this report. As 1990 statistics on sanitation coverage were not available, WASH has projected updated figures based on GOB activity. Coverage data provided by RDO/C have been adjusted to fit WASH population definitions. (Mission data showed 100 percent coverage but indicated a different urban/rural population distribution.) Tables A-1 and A-2 show levels of coverage for each subsector for 1985, 1989, and 1990.

Barbadians essentially have had full coverage (with the exception of rural water, at 99 percent) since 1985, the baseline date for this study (Figures A-1 and A-2). With relatively low growth rates, Barbados has been able to expand coverage to keep pace with population expansion. Despite high coverage rates, however, Barbadians continue to rely heavily on low-quality systems, such as poorly constructed latrines and septic tanks that pose long-term threats to the environment. In recent years, water and sanitation infrastructure development has focused on providing greater access to higher quality systems.

Meeting the 1995 Urban Water and Sanitation Targets

Urban Barbados comprises Bridgetown, the capital city, and its immediate environs. Based on current population and urbanization trends, WASH anticipates that the GOB will be required to provide services to an additional 8,000 Bridgetown residents (Figure A-5) with an investment of approximately \$2.1 million—slightly more than \$1 million for each subsector (Table A-3 and Figure A-3). Although nearly \$25 million in external assistance is anticipated from the IDB and Caribbean Development Bank, there are no ongoing foreign aid programs in the water and sanitation sector. At this time, therefore, Barbados's urban development deficit is \$2.1 million (Table A-3). The deficit is illustrated by subsector in Figure A-3. Since the infrastructure to serve the 1995 urban population is either in place or under construction (in the Bridgetown project), the GOB should be able to maintain full coverage without much external assistance. But the environmental improvements described above will require substantial investments, such as those planned under the IDB-financed South Coast Sewerage Project.

Meeting the 1995 Rural Water and Sanitation Targets

As a result of urbanization and low birth rates, the population of rural Barbados (all areas outside Bridgetown) is not expected to increase over the next five years (Tables A-1 and A-2). Since currently there is full coverage, no new investment is necessary to reach the target levels. As previously observed, however, low-quality systems (latrines, community standpipes, etc.) are concentrated in the rural areas, and improvements will demand considerable resource commitments over the next five years.

TABLE A-1**Actual Water Supply Coverage vs. Targets**

WATER SUPPLY									
YEAR	TOTAL POP.	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POP. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POP. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POP. SERVED	% OF POP. SERVED
1985	253	252	100%	107	107	100%	146	145	99%
1989	254	254	100%	112	112	100%	142	142	100%
1990	254	254	100%	112	112	100%	142	142	100%
TARGETS FOR 1995	261	261	100%	120	120	100%	142	142	100%

Population figures are rounded to the nearest thousand.

TABLE A-2**Actual Sanitation Coverage vs. Targets**

SANITATION									
YEAR	TOTAL POP.	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POP. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POP. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POP. SERVED	% OF POP. SERVED
1985	253	253	100%	107	107	100%	146	146	100%
1989	254	254	100%	112	112	100%	142	142	100%
1990	254	254	100%	112	112	100%	142	142	100%
TARGETS FOR 1995	261	261	100%	120	120	100%	142	142	100%

Population figures are rounded to the nearest thousand.

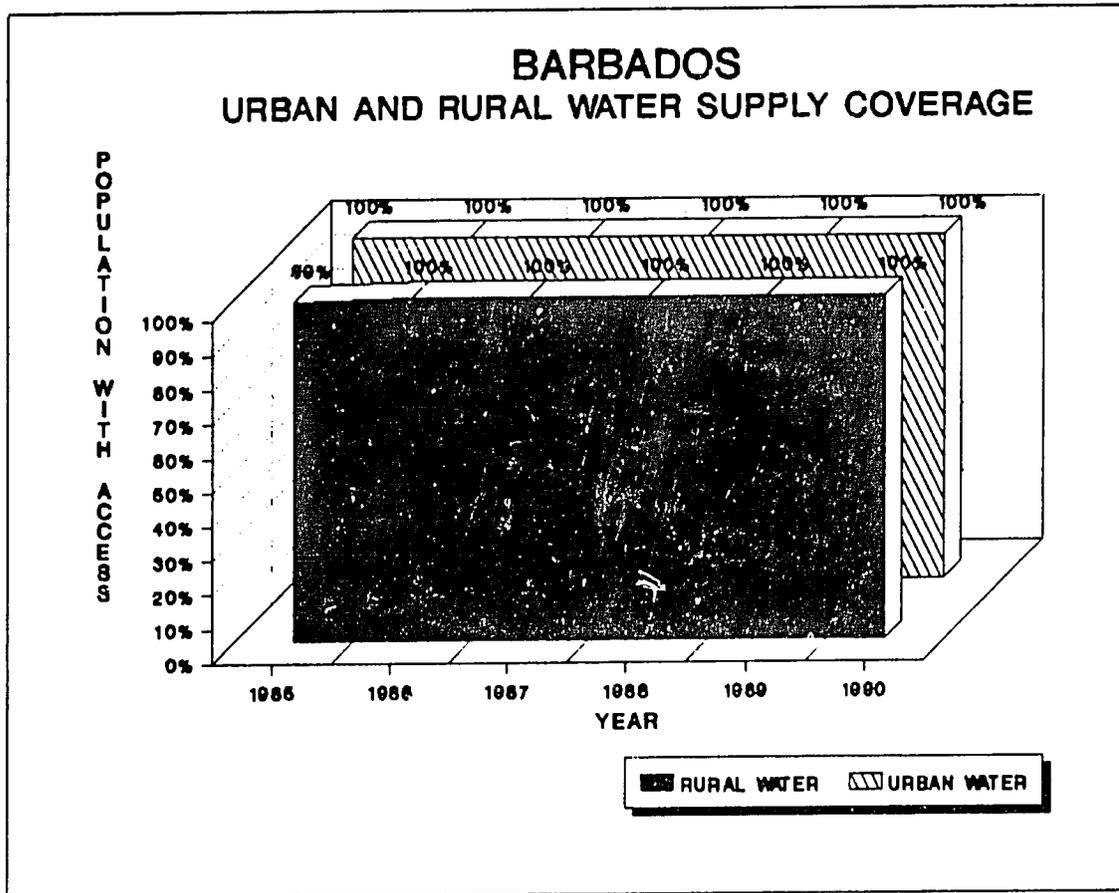


Figure A-1

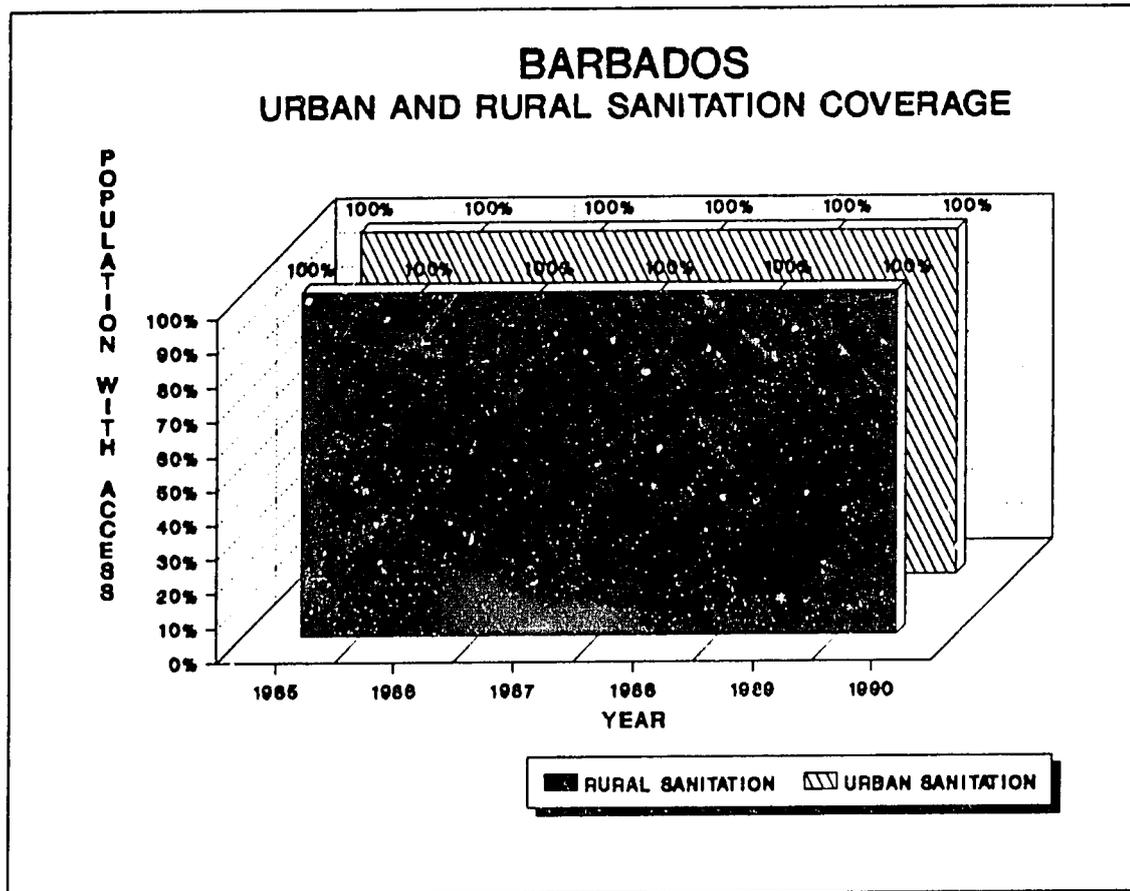


Figure A-2

TABLE A-3

**Investment Needed to Meet 1995 Targets
(1990 US \$000s)**

	WATER SUPPLY COVERAGE (PERSONS—000s)			SANITATION COVERAGE (PERSONS—000s)		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
TARGET FOR 1995 (000s)	262	120	142	262	120	142
COVERAGE IN 1990	254	112	142	254	112	142
REQUIRED INCREASE	8	8	0	8	8	0
ESTIMATED UNIT COST (US \$ PER CAPITA)	N/A	\$131	\$131	N/A	\$131	\$105
ESTIMATED TOTAL COST TO MEET 1995 TARGETS	\$1,048	\$1,048	\$0	\$1,048	\$1,048	\$0
FIRMLY COMMITTED INVESTMENTS (000s)*	\$0	\$0	\$0	\$0	\$0	\$0
PROJECTED FUNDING SHORTFALL (\$000s)	\$1,048	\$1,048	\$0	\$1,048	\$1,048	\$0

TOTAL FUNDING SHORTFALL

\$2,096

* Includes only those investments to increase coverage.

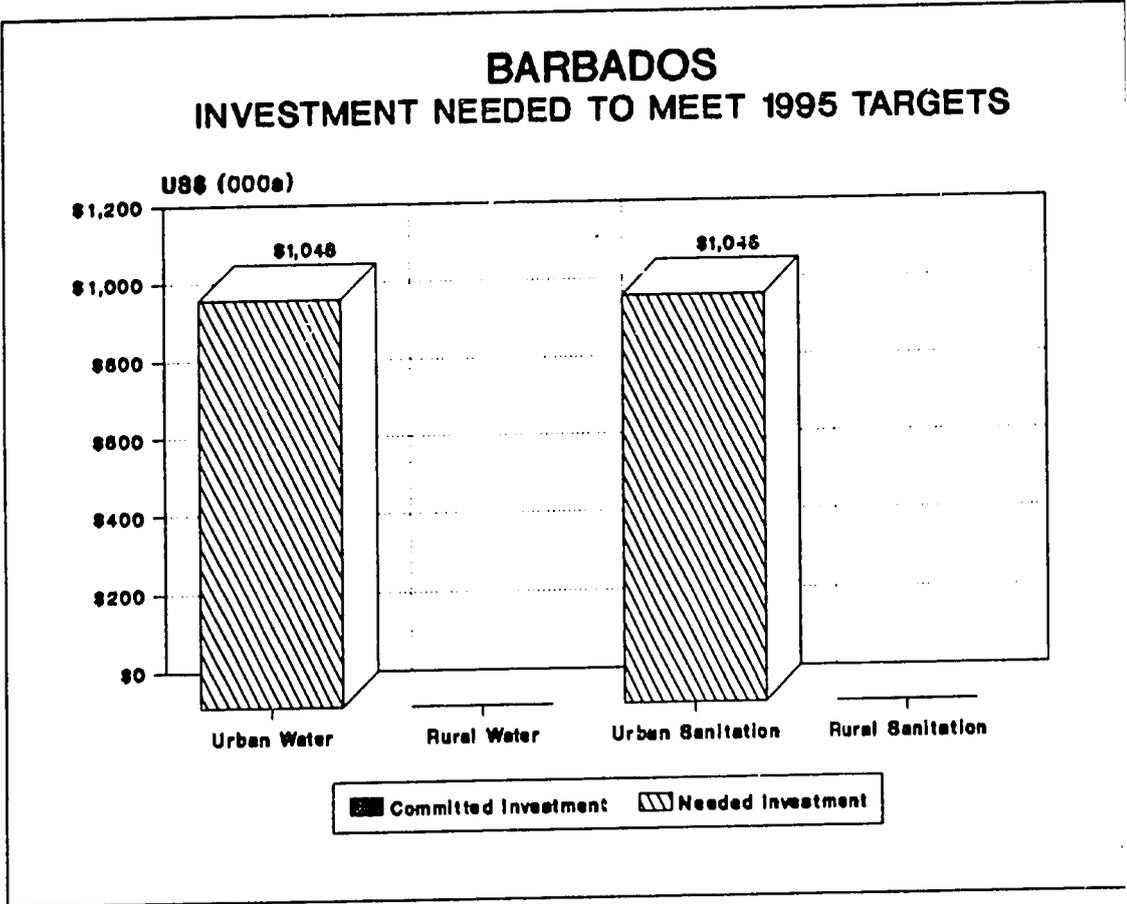


Figure A-3

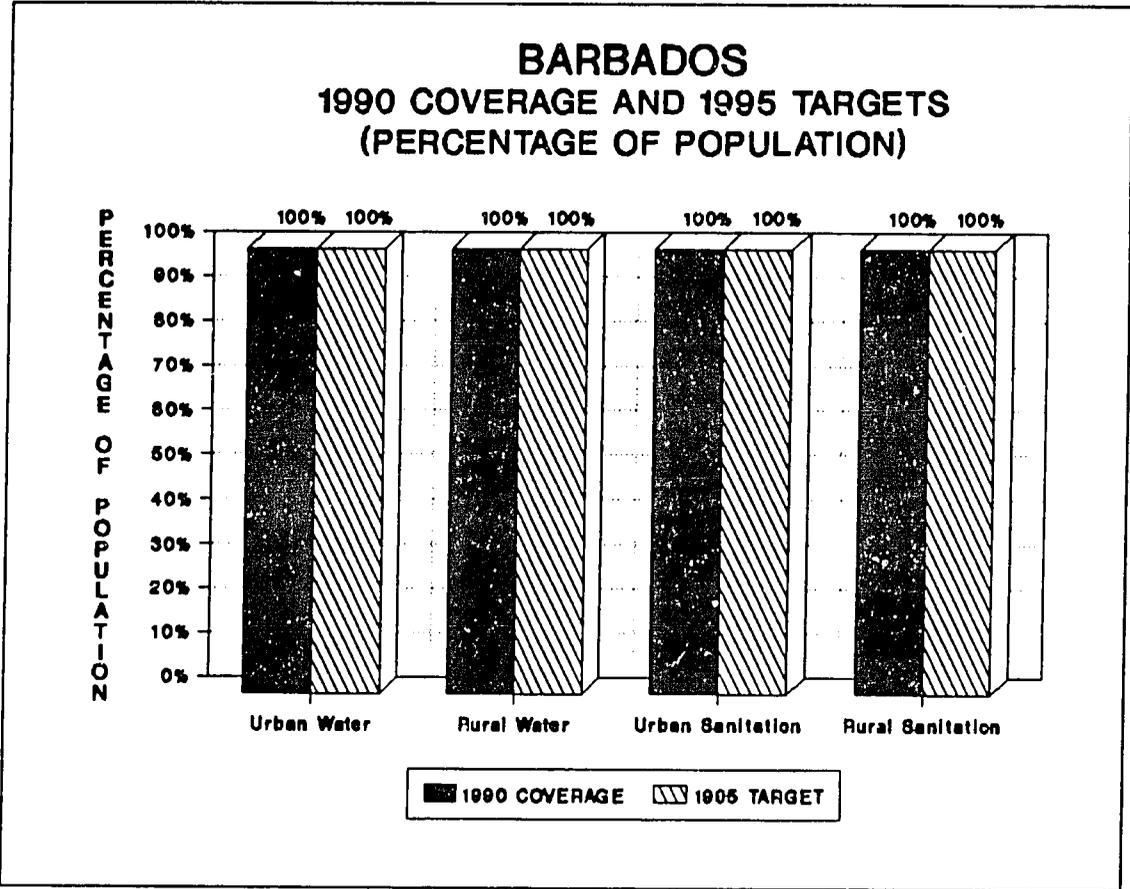


Figure A-4

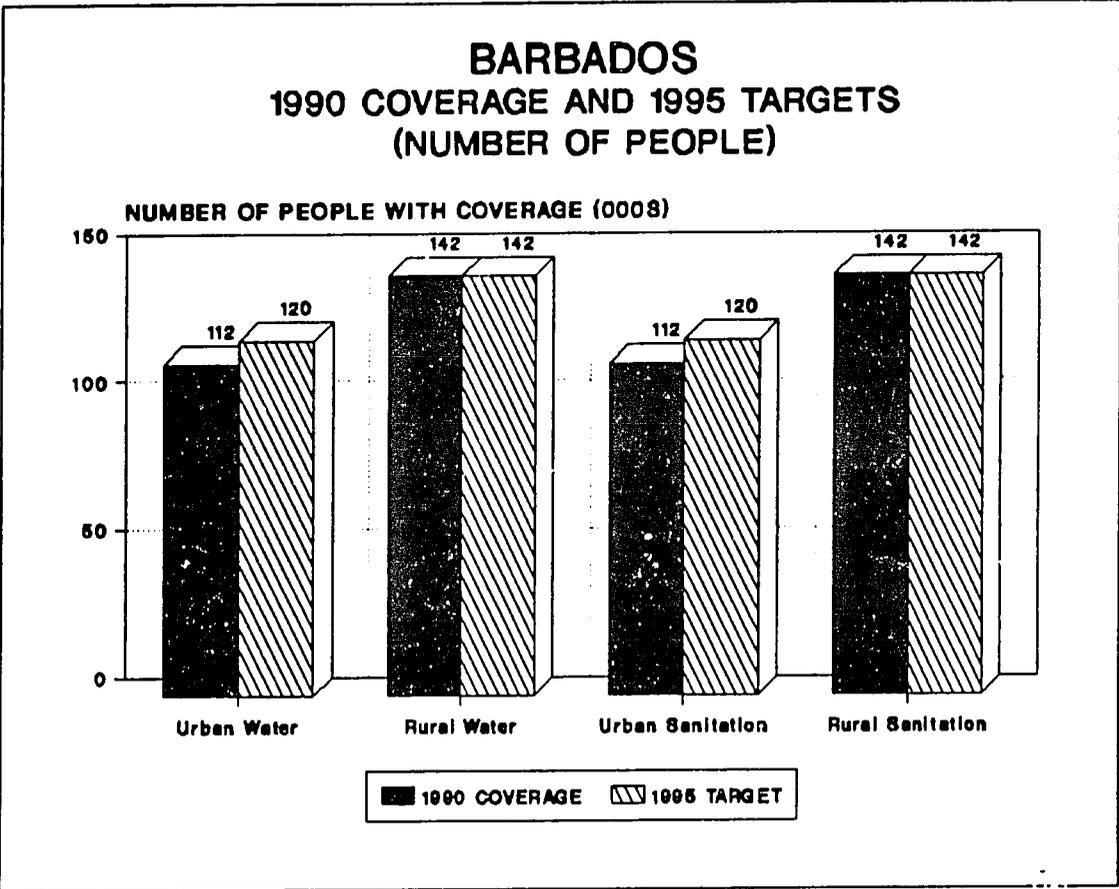
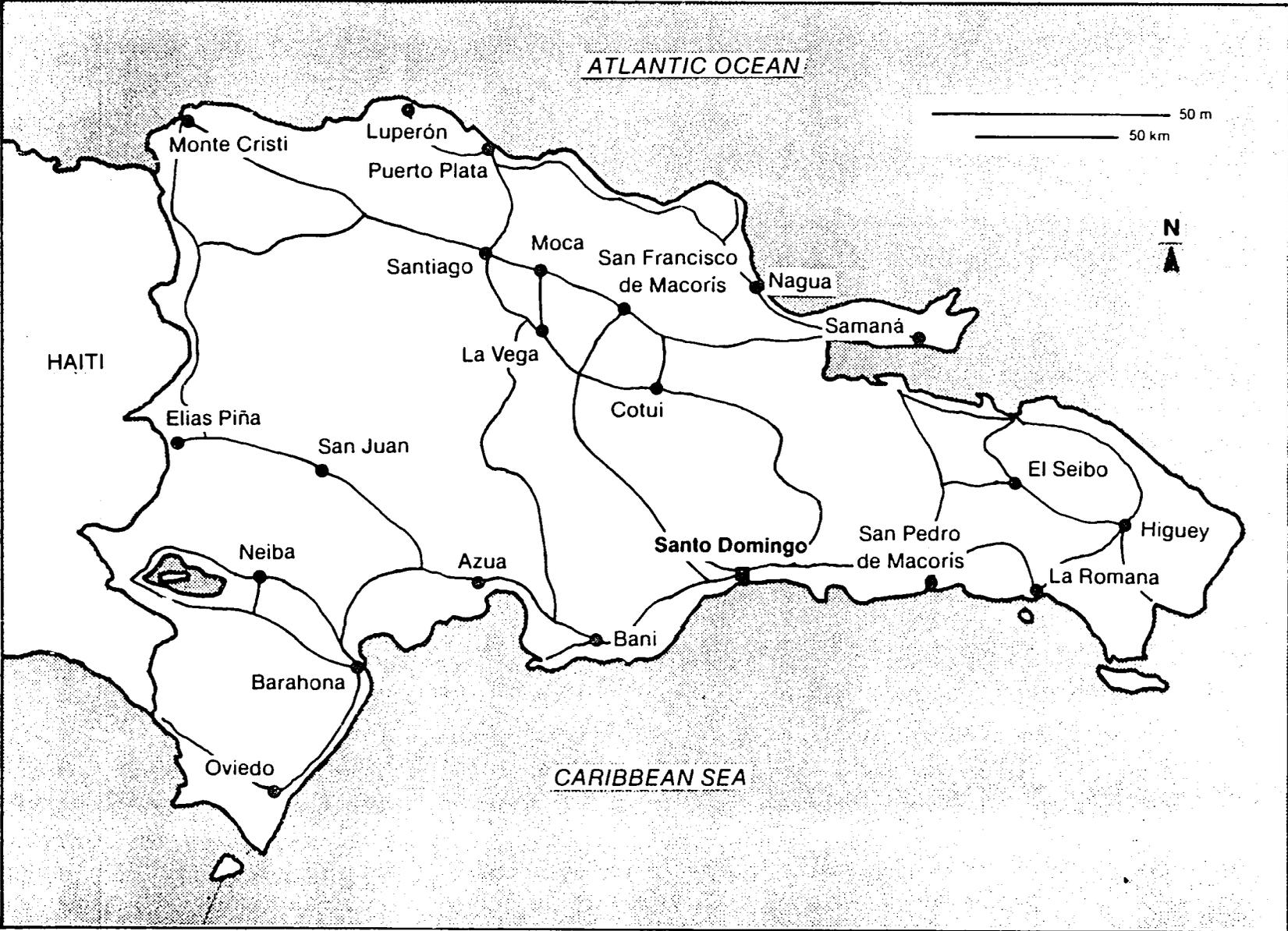


Figure A-5

DOMINICAN REPUBLIC



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APPENDIX B

DOMINICAN REPUBLIC

COUNTRY BACKGROUND

In the 1980s, the Dominican Republic entered a period of economic decline characterized by shrinking external demand for its traditional exports, escalating public debt, stagnating agricultural and industrial production, and rising unemployment. The Government of the Dominican Republic (GODR) responded by devaluating the currency, implementing various adjustment policies, and fostering the development of tourism and industrial free trade zones. Despite a temporary recovery stimulated by these measures, the country continues to face severe economic pressures. In 1980-87, GDP growth averaged 1.3 percent per year, compared with 6.7 percent per year between 1965 and 1980 (PAHO).

COUNTRY PROFILE	
1990 Population:	7.24 million Urban: 4.27 million Rural: 2.97 million
Population Growth Rate:	Overall: 2.1% Urban: 3.3% Rural: .4%
Infant Mortality Rate:	61
Under 5 Mortality Rate:	77
Mortality Rate due to Infectious and Parasitic Diseases:	51.4
Mortality Rate due to Diarrheal Diseases:	27.1
Life Expectancy:	66
Adult Literacy:	77%
GNP per Capita (1989):	\$790
GNP per Capita (1988):	\$720
GNP per Capita Annual Growth from 1965-88:	2.7%
Currency:	Pesos 13.13 = \$1
Average Annual Inflation from 1980-88:	16.8%

In the health sector, the GODR has given priority to expanding health coverage, providing adequate financing, equipment, and supplies, strengthening the national child survival plan, and promoting MCH care. Infant and child mortality have declined progressively over the past decade, largely as a consequence of the increased use of preventive technologies, such as oral rehydration and vaccination. Nevertheless, health conditions are still poor; at 61/1,000 population, the infant mortality is three times that of Jamaica. The principal causes of child mortality are infectious intestinal diseases (primarily diarrhea), followed by diseases of the respiratory tract and nutritional deficiencies (PAHO). Inadequate water and sanitation facilities and poor food safety are significant factors in the continued prevalence of diarrhea and parasitic diseases like dysentery, typhoid, and hepatitis.

Progress in expanding water and sanitation services during the International Drinking Water Supply and Sanitation Decade (IDWSSD) was slow. In addition to the impact on health, the lack of basic sanitation poses a serious threat to the environment. The Dominican Republic, like many Caribbean nations, disposes of large volumes of untreated waste in its waterways and the sea. Inadequate provision for solid waste collection and disposal has led to the clogging of sewerage systems and the proliferation of illegal dumps.

- **IDB**

From 1968 to 1989, the IDB provided loan financing through its PLANAR project. It has no active loans in the water and sanitation sector at this time but is in the early stages of developing a project for the construction and expansion of potable water and sanitation systems for intermediate-sized cities. No further details on the project are available. The IDB continues to be widely involved in irrigation projects.

Total funding committed to increase coverage: \$0

- **CARE**

CARE's Community Water and Health Project will provide 18 communities with dependable and adequate water supplies and will teach improved hygiene and sanitation practices. The increased availability of clean water and a better understanding of health and hygiene will advance the goal of improved health and well-being for project participants. Funding for FY 1991 has been approved by CARE/USA at \$30,800, most of which will support water system construction and expansion.

Total funding committed to increase coverage: \$25,000

- **Government of Italy**

The Government of Italy has provided CAASD with \$75 million to increase water supplies for the 1.8 million residents of Santo Domingo and Valdesia. The project, initiated in 1987, is scheduled for completion in 1992.

The Italian government is also sponsoring a large project in the province of Santiago to expand and improve water supply systems in the towns of Santiago, Moca, Licy, and Tamboril. This \$50 million project under CORAASAN was begun in 1990 and is schedule to end in 1992. It will improve water services for approximately 600,000 people. WASH has included 10 percent of the remaining disbursements under these projects in the investment analysis.

Total funding committed to increase coverage: \$5.5 million

- **PAHO**

PAHO is providing inter-institutional coordination, working to improve the quality of information available on water and sanitation, and assisting with institutional development

and training in operations and maintenance, particularly in the use of filters. Since these activities do not contribute to increased coverage, no PAHO monies are included in the funding analysis.

Total funding committed to increase coverage: \$0

- **Servicios Sociales de Iglesias Dominicanas (SSID)**

In recent years, SSID, a local PVO, has installed wells, cisterns, latrines, and simple water supply systems for residents of rural communities throughout the island. SSID is expected to maintain these activities at a level of \$27,000 annually.

Total funding committed to increase coverage: \$27,000

- **UNDP**

The two-year Rural Water Supply Project, financed with \$182,000 from the Arab Fund for Development, is scheduled to end in mid- to late 1991. Implemented by a local NGO and overseen by ONAPLAN (the Office of National Planning) and the UNDP, the project has installed four photovoltaic water supply systems serving 13 rural communities with an estimated population of 17,500. The project has also sponsored community activities to raise awareness of the link between hygiene and health and clean water.

Total funding committed to increase coverage: \$40,000

Current Coverage

Since 1985, access to water supply services has climbed 17 points to reach 65 percent coverage in 1990. Sanitation coverage, however, remains at 64 percent—the same level as in 1985—after recovering from a decline to 60 percent in 1989. National coverage is low primarily because of deplorable conditions in rural regions, where more than 40 percent of Dominicans reside. Only 27 percent of rural residents have access to drinking water and 40 percent to basic sanitation facilities, which covered 61 percent in 1985. Rural water supply services have increased from 25 percent to only 27 percent in five years. Access to facilities in urban areas is significantly higher but still below corresponding levels in Jamaica, Grenada, and Barbados. An estimated 92 percent of urban Dominicans have adequate access to water and 80 percent to sanitation. Urban and rural coverage levels are shown in Tables B-1 and B-2. Water and sanitation coverage levels are illustrated graphically in Figures B-1 and B-2.

As mentioned earlier, the lack of adequate water and sanitation facilities contributes significantly to the prevalence of infectious and water-borne parasitic diseases and makes improvements in the sector an urgent necessity.

Meeting the 1995 Urban Water and Sanitation Targets

About 3.9 million (92 percent) of the 4.3 million urban residents have adequate access to water supply systems, and 3.4 million (80 percent) have adequate sanitation (Tables B-1 and B-2). WASH's 1995 targets call for increases in these levels to 93 percent and 85 percent, respectively. These advances, shown graphically in Figures B-4 and B-5, will require the extension of water services to an additional 676,000 persons and sanitation to 779,000. WASH estimates that approximately \$160 million—\$72 million for water and \$88 million for sanitation services—will be necessary to meet these goals. Table B-3 shows funding requirements and deficits for each subsector and Figure B-3 illustrates them graphically.

Foreign donors have committed an estimated \$5.8 million for urban sector development. No externally funded projects are reported pending. Faced with a deficit of \$155 million for the urban subsectors alone, the GODR is unlikely to meet the targets without additional aid.

Meeting the 1995 Rural Water and Sanitation Targets

Investments in rural areas, where only 27 percent of the 3 million residents have adequate access to water and 40 percent to sanitation, are a vital component of efforts to improve health conditions. The WASH targets raise water coverage to 43 percent, expanding service to cover 491,000 persons more, and sanitation coverage to 40 percent, to reach an additional 260,000 persons. Current coverage and 1995 targets are compared in Tables B-1 and B-2 and illustrated graphically in Figures B-4 and B-5. Although the projected gains are large in percentage terms (16 points for water and 8 points for sanitation), they are modest in terms of persons covered when compared with urban sector objectives. According to WASH estimates, these goals will require a \$42 million investment in rural development: \$34 million for water and \$8 million for sanitation (Table B-3). Since current commitments total only \$817,000, the GODR faces a deficit of almost the entire amount in the two rural subsectors and a total deficit of \$197 million for the sector. Figure B-3 shows current investment commitments as a fraction of total funding requirements, illustrating the need for additional financial support.

To reduce the health risks associated with unhygienic conditions, it is vital that greater resources be committed to the rural areas. At present, only 12 percent of external funds are allocated to them.

TABLE B-1

Actual Water Supply Coverage vs. Targets

WATER SUPPLY									
YEAR	TOTAL POPULATION	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POPULATION SERVED	% OF POP. SERVED	TOTAL URBAN POPULATION	POPULATION SERVED	% OF POP. SERVED	TOTAL RURAL POPULATION	POPULATION SERVED	% OF POP. SERVED
1985	6,416	3,097	48%	3,498	2,363	68%	2,918	734	25%
1989	7,019	4,416	63%	4,065	3,618	89%	2,954	798	27%
* 1990	7,250	4,746	65%	4,274	3,932	92%	2,976	814	27%
TARGETS FOR 1995	7,991	5,913	74%	4,955	4,608	93%	3,036	1,305	43%

*Population figures are rounded to the nearest thousand.
Data for 1990 are WASH projections.*

TABLE B-2

Actual Sanitation Coverage vs. Targets

SANITATION									
YEAR	TOTAL POPULATION	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POPULATION SERVED	% OF POP. SERVED	TOTAL URBAN POPULATION	POPULATION SERVED	% OF POP. SERVED	TOTAL RURAL POPULATION	POPULATION SERVED	% OF POP. SERVED
1985	6,416	4,101	64%	3,498	2,325	66%	2,918	1,776	61%
1989	7,019	4,215	60%	4,065	3,211	79%	2,954	1,004	34%
* 1990	7,250	4,630	64%	4,274	3,433	80%	2,976	1,197	40%
TARGETS FOR 1995	7,991	5,669	71%	4,955	4,212	85%	3,036	1,457	48%

*Population figures are rounded to the nearest thousand.
Data for 1990 are WASH projections.*

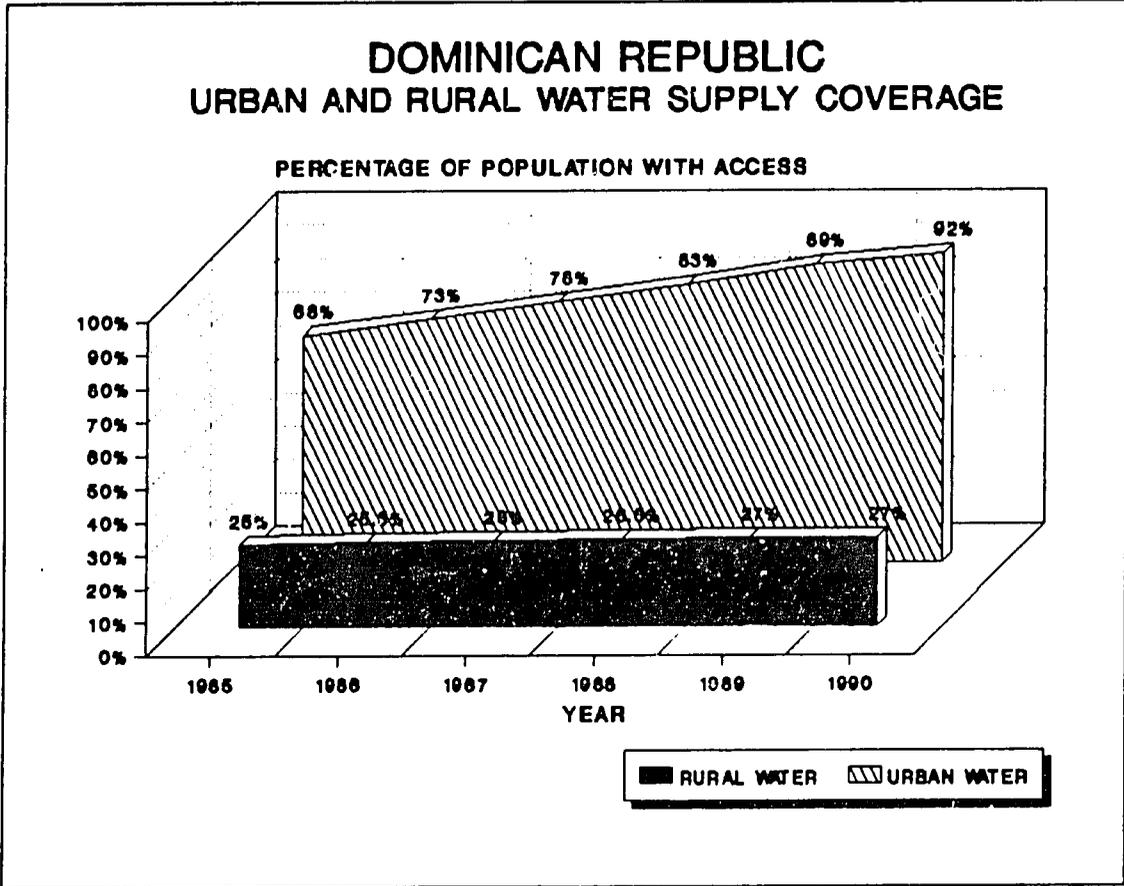


Figure B-1

DOMINICAN REPUBLIC URBAN AND RURAL SANITATION COVERAGE

PERCENTAGE OF POPULATION WITH ACCESS

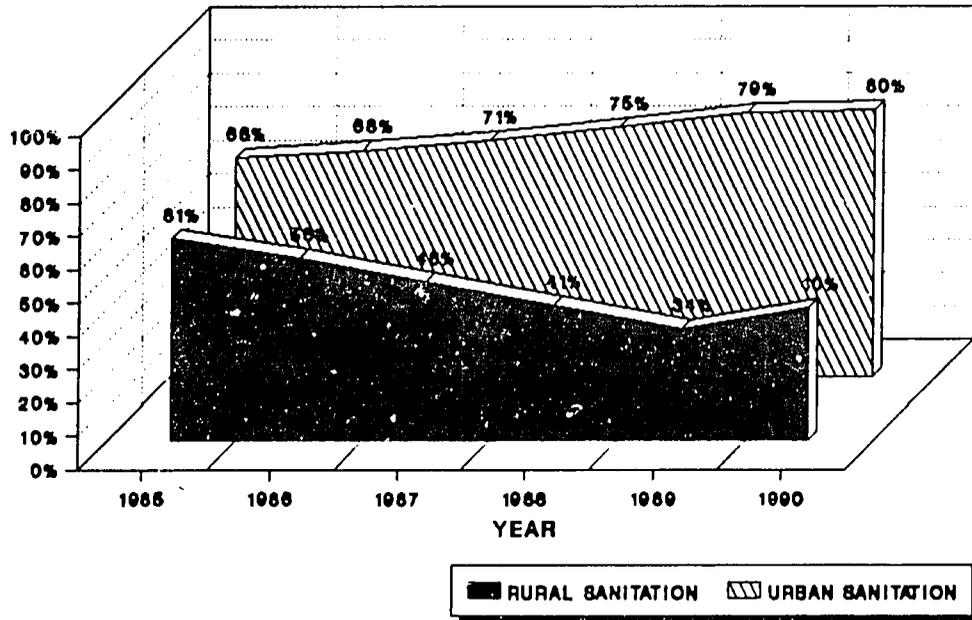


Figure B-2

TABLE B-3

**Investment Needed to Meet 1995 Targets
(1990 US \$000s)**

	WATER SUPPLY COVERAGE (PERSONS—000s)			SANITATION COVERAGE (PERSONS—000s)		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
TARGET FOR 1995 (000s)	5,913	4,608	1,305	5,669	4,212	1,457
COVERAGE IN 1990	4,746	3,932	814	4,630	3,433	1,197
REQUIRED INCREASE	1,167	676	491	1,039	779	260
ESTIMATED UNIT COST (US \$ PER CAPITA)	N/A	\$107	\$71	N/A	\$113	\$32
ESTIMATED TOTAL COST TO MEET 1995 TARGETS	\$107,193	\$72,332	\$34,861	\$96,347	\$88,027	\$8,320
FIRMLY COMMITTED INVESTMENTS (000s)*	\$3,372	\$2,809	\$563	\$3,220	\$2,966	\$254
PROJECTED FUNDING SHORTFALL (\$000s)	\$103,821	\$69,523	\$34,298	\$93,127	\$85,061	\$8,066

TOTAL FUNDING SHORTFALL \$196,948

* Includes only those investments to increase coverage.

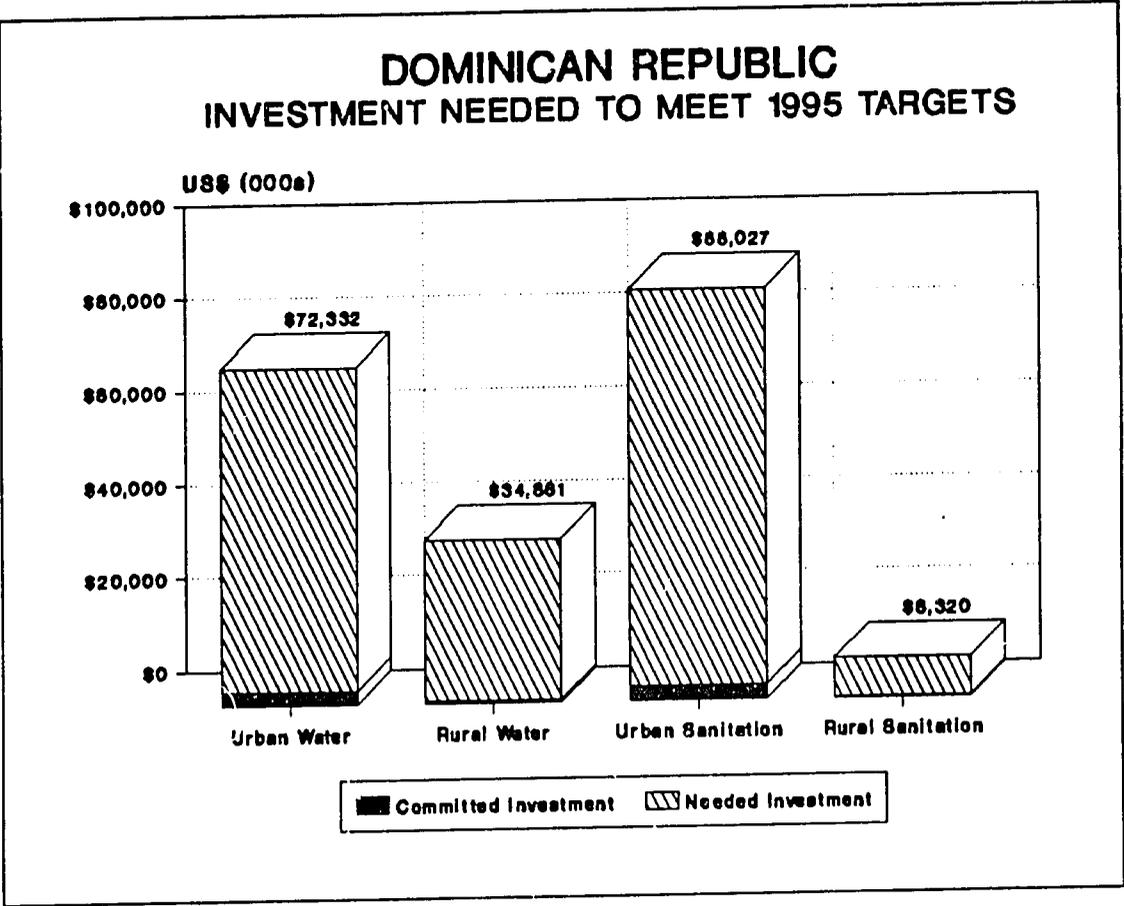


Figure B-3

**DOMINICAN REPUBLIC
1990 COVERAGE AND 1995 TARGETS
(PERCENTAGE OF POPULATION)**

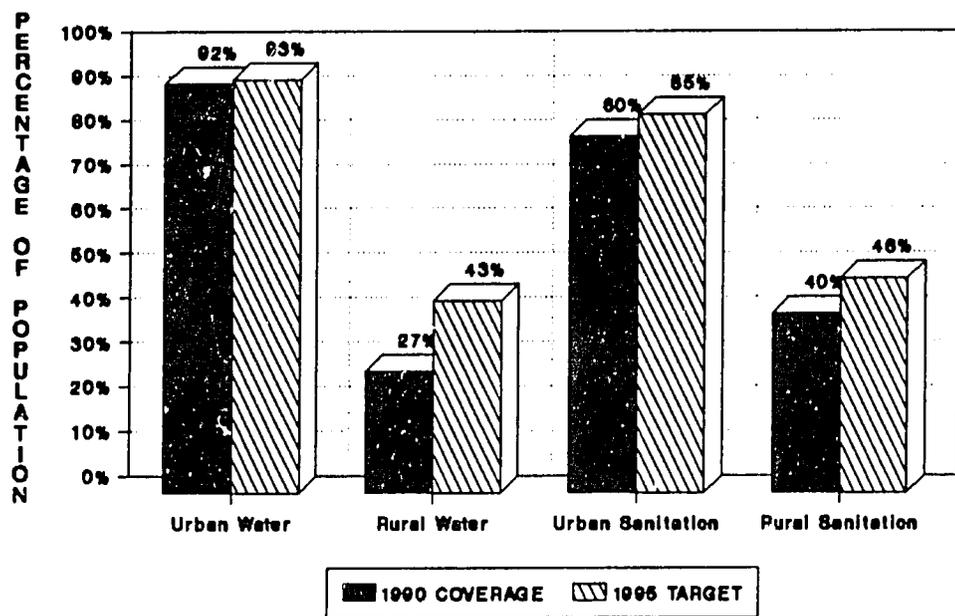


Figure B-4

DOMINICAN REPUBLIC 1990 COVERAGE AND 1995 TARGETS (NUMBER OF PEOPLE)

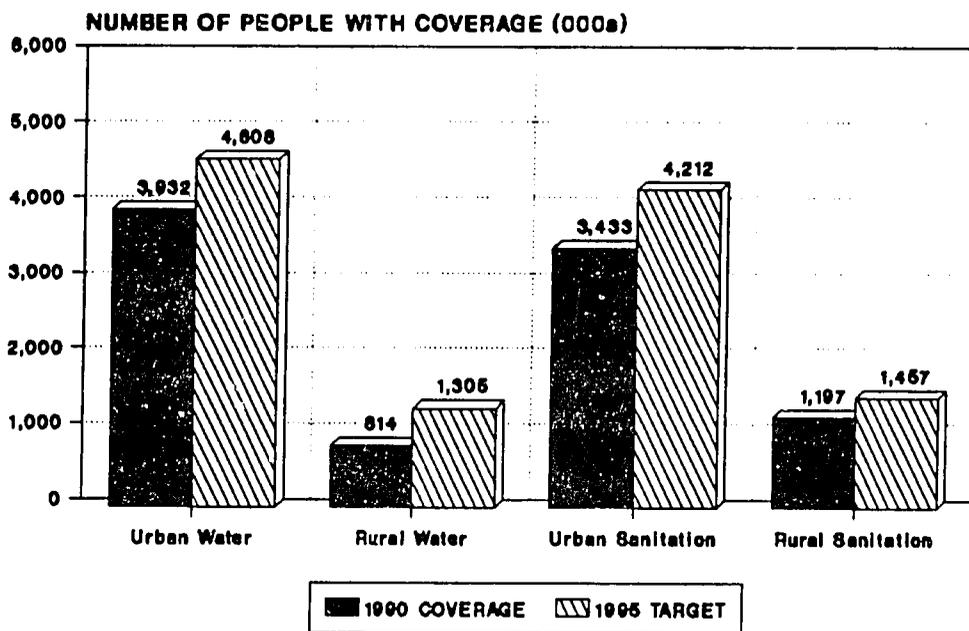
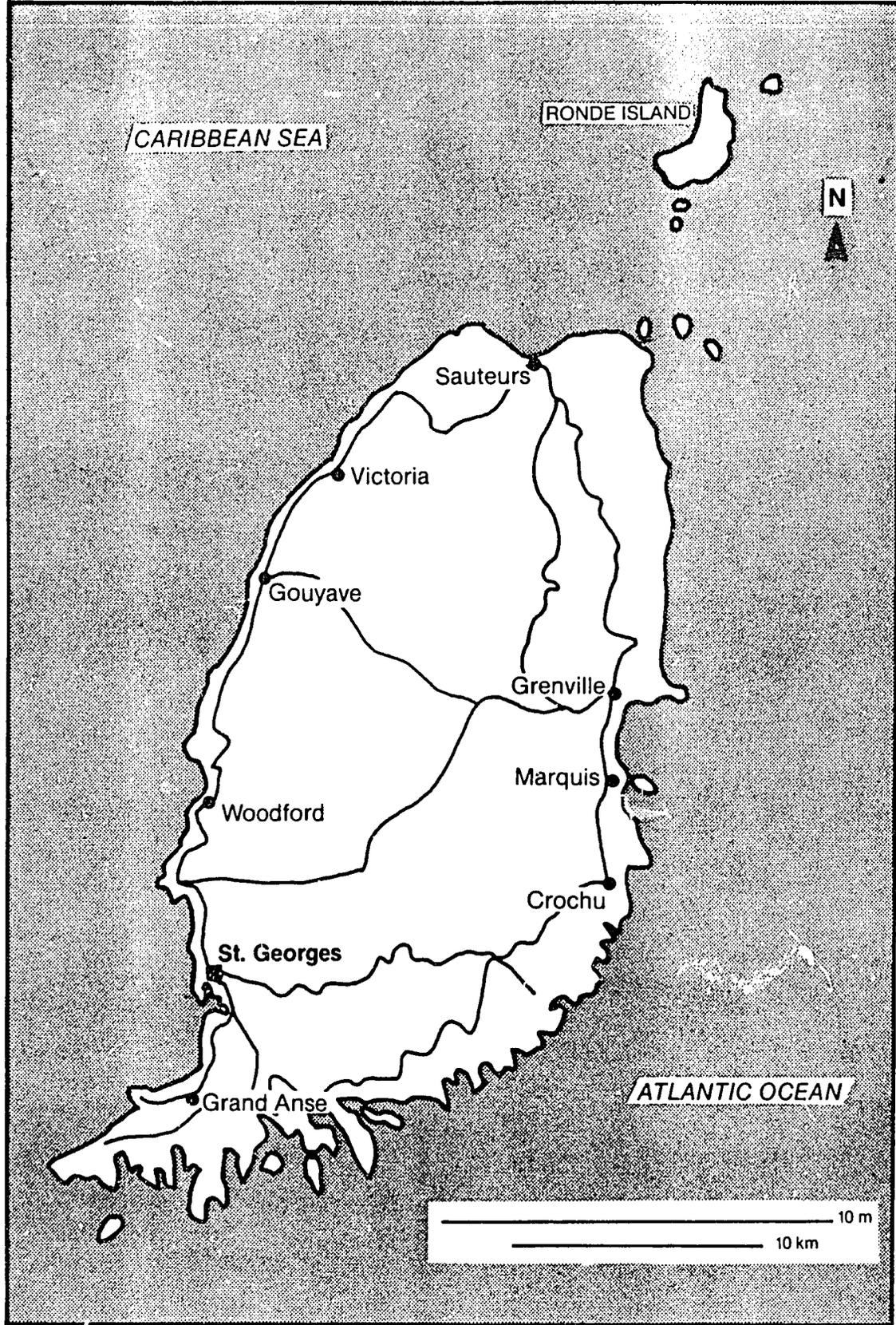


Figure B-5

GRENADA



APPENDIX C

GRENADA

COUNTRY BACKGROUND

Grenada, the smallest island nation in this report, covers 344 square kilometers. Its economy has grown at a steady, albeit slow, pace in recent years, with GNP growth in 1988 estimated at 1.4 percent per year. The government recently has implemented structural adjustment policies and has sought to foster increased investment in agricultural and industrial development. It has also fostered considerable infrastructural investment in the tourism sector, which has expanded rapidly. The annual rate of inflation, which averaged 11.1 percent between 1965 and 1980, declined significantly to 4.7 percent between 1980 and 1989. Despite these positive trends, Grenada is faced with mounting external debt as imports continue to outpace exports.

COUNTRY PROFILE

1990 Population:	95,000
Population Growth Rate:	.1%
Infant Mortality Rate:	28.7
Under 5 Mortality Rate:	33
Mortality Rate due to Infectious and Parasitic Diseases:	N/A
Mortality Rate due to Diarrheal Diseases:	N/A
Life Expectancy:	69.2
Adult Literacy:	96%
GNP per Capita (1989):	\$1,900
GNP per Capita (1988):	\$1,720
GNP per Capita Annual Growth from 1965-88:	N/A
Currency:	E. Caribbean Dollars 27=\$1
Average Annual Inflation from 1980-88:	7.4%

Health conditions in Grenada are relatively good. The population is young; PAHO reports that in 1987 37.2 percent of the population was under the age of 15 and only 7.1 percent over 65. Access to health care is good, with a public system of 6 health centers, 27 visiting stations, 1 outpost clinic, 1 maternity center, 8 dental clinics, and 6 hospitals (PAHO). Immunization of children has expanded significantly in the past five years. The infant mortality rate has declined from 18.1 per 1,000 live births in 1985 (PAHO) to 13.8 in 1990. PAHO reports that the chief causes of infant mortality are prematurity, congenital anomalies, and respiratory infections. The leading causes of adult mortality are heart disease, cerebrovascular disease, diabetes, and hypertension. Infectious and parasitic diseases, often related to poor water and sanitation, are not prevalent.

Although coverage estimates are high (90 percent for water and 96 percent for sanitation), the existing infrastructure, particularly in sanitation, is poorly developed. A significant portion of residential St. George's is not connected to the sewerage system, and, according to PAHO, this area and those to the south in Grand Anse are affected by septic tank effluent run-off. Along the coast, hotels and other buildings discharge partially treated wastewater into the sea. Insanitary latrines are widespread. Systems for solid waste disposal, in greater demand with the growth of tourism and other industries, are also inadequate.

Grenada's National Water and Sewerage Authority (NWASA) is responsible for developing, operating, and maintaining water and sewerage systems on the island.

COVERAGE LEVELS AND INVESTMENT

Current Projects

Relatively little external assistance currently is committed to water and sanitation development. A.I.D. is funding a sanitation project, and PAHO and CIDA have provided assistance in recent years but not for projects to raise coverage levels. With the completion of a new master plan in 1991, CIDA expects to make a contribution to the sector.

- **A.I.D.**

A.I.D. is funding a \$4.4 million project, scheduled for completion in April 1992, for the construction of a sewerage network to serve an estimated 10,000 persons in residential communities and hotels in the Grand Anse area of the island. Funds from this project will also finance a pumping station and an outfall to the sea. Since most of the investment is in indirect-user facilities, only one-third of the total is included in the analysis.

Total funding committed to increase coverage: \$1,500,000

- **CIDA**

CIDA is financing the construction of a pumping station and outfall sewer in St. George's (to replace systems damaged by a hurricane), which is almost complete. A second project, for retrofitting a pumping station, was completed in 1990. With the end of the St. George's project, CIDA will have no part in the sector.

Future participation will depend on the master plan for water and sanitation, expected in 1991. CIDA hopes to provide approximately \$11 million for various activities in the sector, but neither the level of funding nor the activities to be undertaken have been approved.

Total funding committed to increase coverage: \$0

- **PAHO**

PAHO is providing technical assistance for an environmental health program reflecting the government's priorities. Resources and support from the Caribbean Environmental Health Institute (CEHI), CEPIS, and ECO will also be provided for this activity.

Total funding committed to increase coverage: \$0

Current Coverage

Little progress has been made in expanding water and sanitation services over the past five years. At 80 percent, water coverage has dropped from the level of 90 percent reported in 1985, while sanitation coverage has increased from 92 percent to 95 percent. Because of the small population (86,000), the 4 percent increase in sanitation services represents service expansion to only 3,000 persons. Coverage trends are shown in Tables and Figures C-1 and C-2. Estimates for 1989 coverage have been updated to incorporate revised data provided by NWASA through RDO/C.

Meeting the 1995 Water and Sanitation Targets

WASH has targeted 100 percent coverage in both water and sanitation by 1995 (Tables C-1 and C-2), which means an additional 5,000 residents must be provided with sanitation service and 19,000 with water supply service. Figures C-4 and C-5 illustrate the gap between current coverage and target levels. WASH has estimated that a total investment of \$2.5 million will be required. Since no external assistance has been committed to the water sector (although CIDA may make a substantial contribution), the entire amount will have to be found. In sanitation, the ongoing USAID project should provide the funding to expand the existing infrastructure. Figure C-3 illustrates current funding commitments and requirements.

As noted earlier, the sanitation infrastructure is weak, and poorly constructed latrines and septic tanks are a significant source of pollution. Considerable funding will be required to remedy this.

TABLE C-1**Actual Water Supply Coverage vs. Targets**

WATER SUPPLY			
YEAR	TOTAL POPULATION	POPULATION SERVED	% OF POP. SERVED
* 1985	94	77	82%
1989	95	76	80%
1990	95	76	80%
TARGET FOR 1995	95	95	100%

*Population figures are rounded to the nearest thousand.
* 1985 population is estimated.*

TABLE C-2**Actual Sanitation Coverage vs. Targets**

YEAR	TOTAL POPULATION	POPULATION SERVED	% OF POP. SERVED
* 1985	94	79	84%
1989	95	90	95%
1990	95	90	95%
TARGET FOR 1995	95	95	100%

*Population figures are rounded to the nearest thousand.
* 1985 population is estimated.*

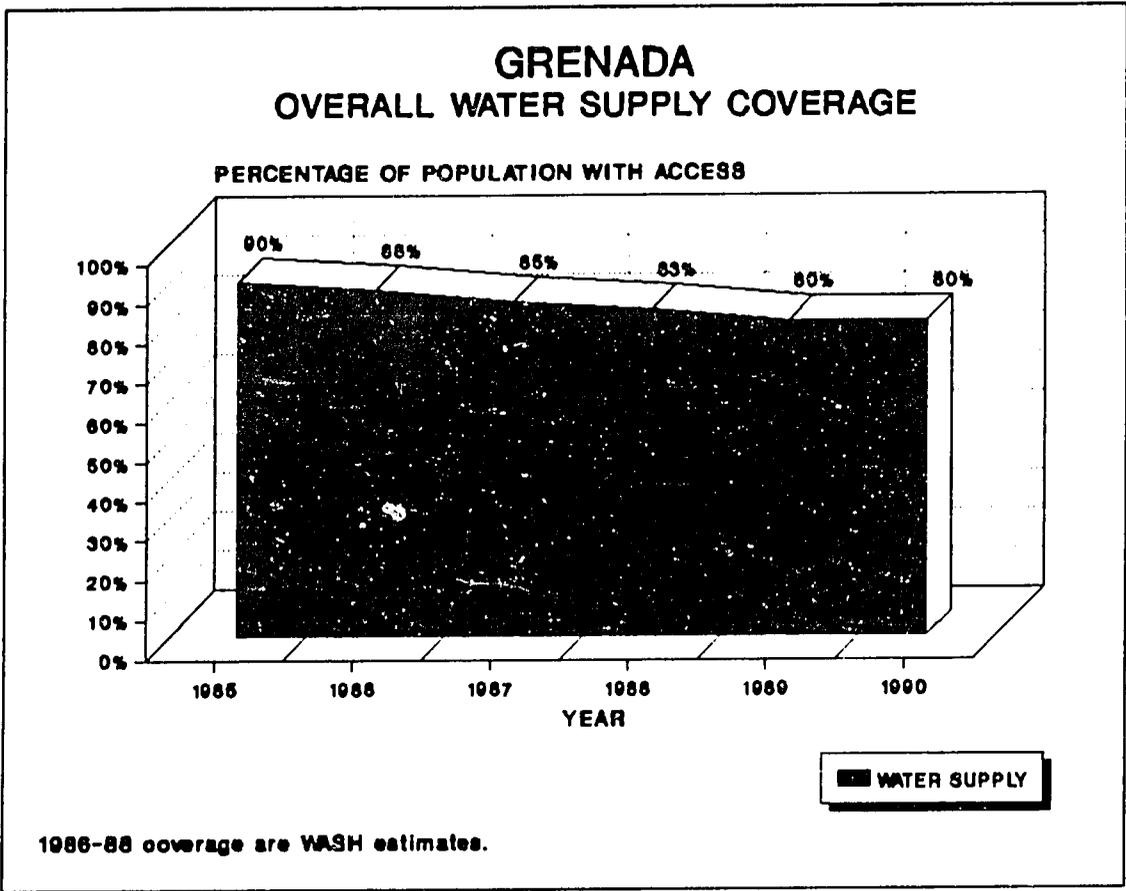


Figure C-1

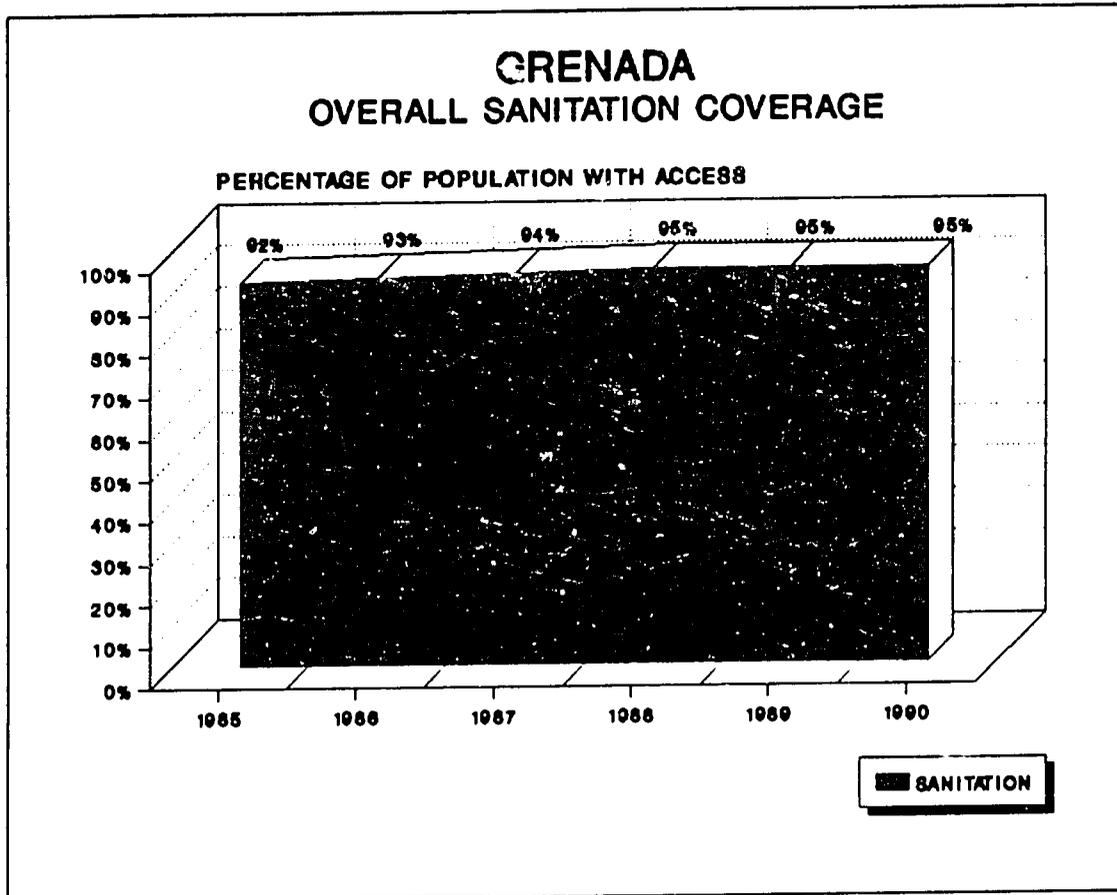


Figure C-2

TABLE C-3

**Investment Needed to Meet 1995 Targets
(1990 US \$000s)**

	WATER SUPPLY COVERAGE (PERSONS—000s)			SANITATION COVERAGE (PERSONS—000s)		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
TARGET FOR 1995 (000s)	95	95	N/A	95	95	N/A
COVERAGE IN 1990	76	76	N/A	90	90	N/A
REQUIRED INCREASE	19	19	0	5	5	0
ESTIMATED UNIT COST (US \$ PER CAPITA)	N/A	\$131	N/A	N/A	\$131	N/A
ESTIMATED TOTAL COST TO MEET 1995 TARGETS	\$2,489	\$2,489	N/A	\$655	\$655	N/A
FIRMLY COMMITTED INVESTMENTS (000s)*	\$0	\$0	N/A	\$1,500	\$1,500	N/A
PROJECTED FUNDING SHORTFALL (\$000s)	\$2,489	\$2,489	N/A	\$0	\$0	N/A

TOTAL FUNDING SHORTFALL

\$2,489

* Includes only those investments to increase coverage.

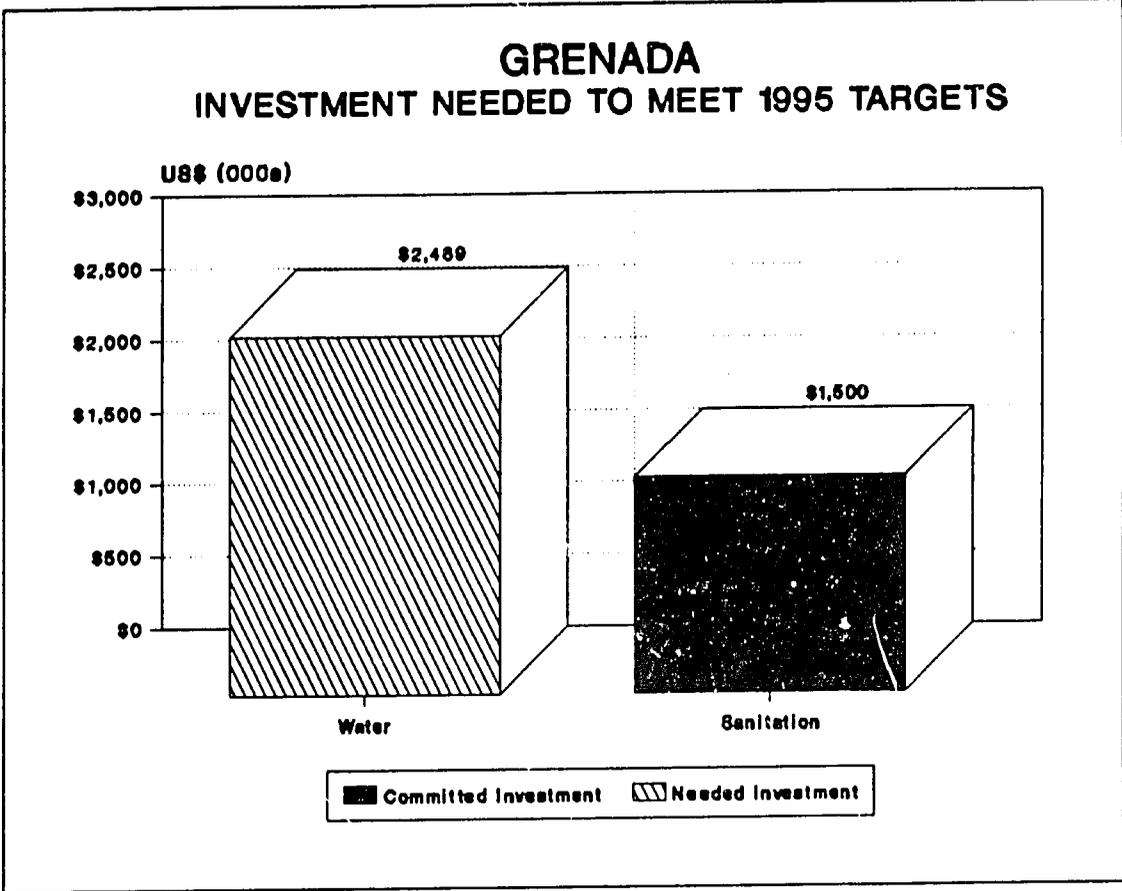


Figure C-3

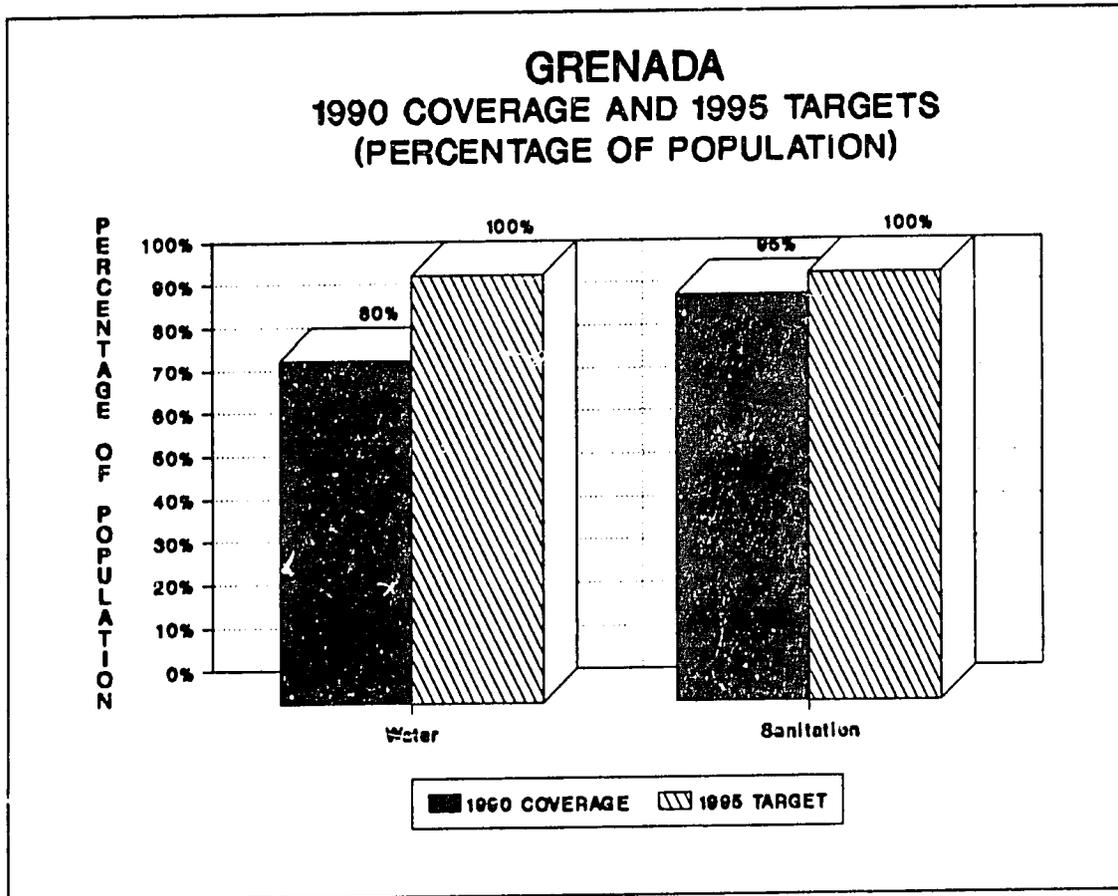


Figure C-4

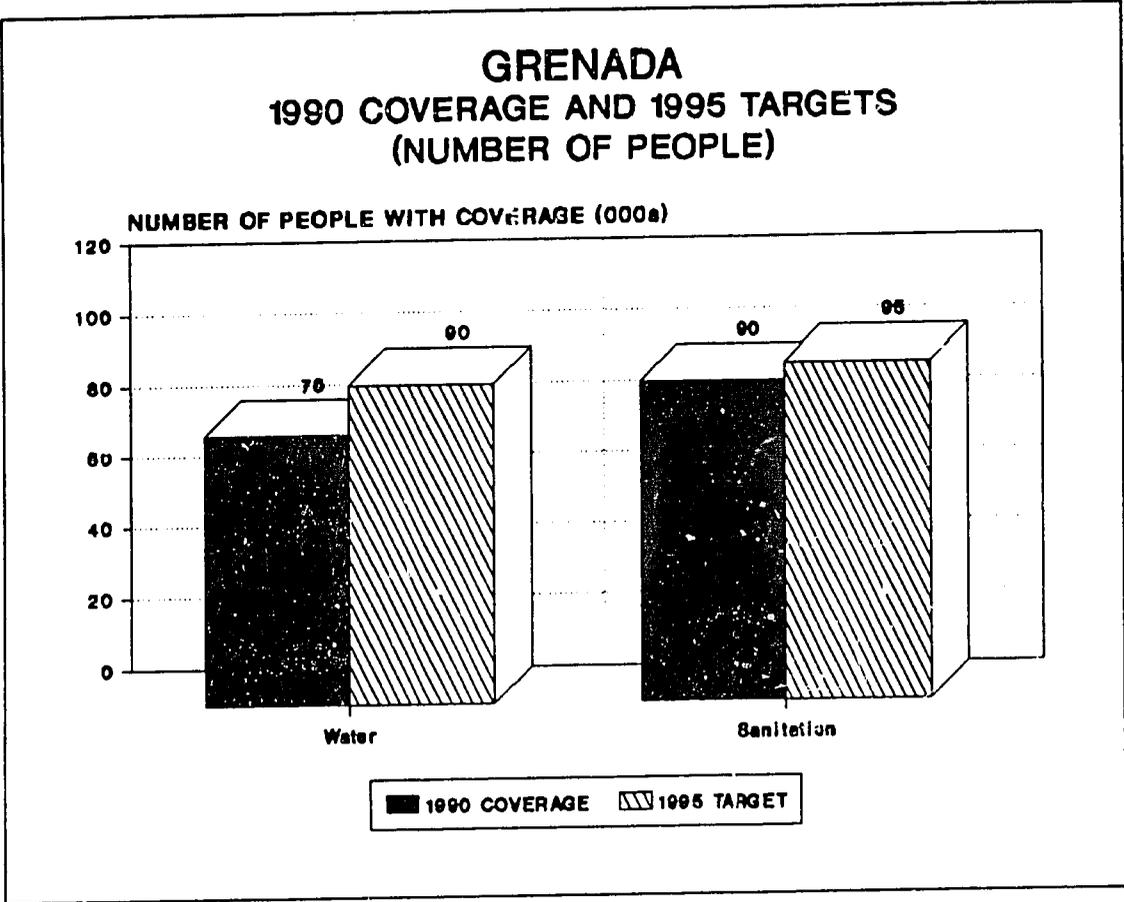
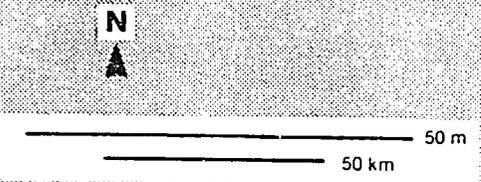
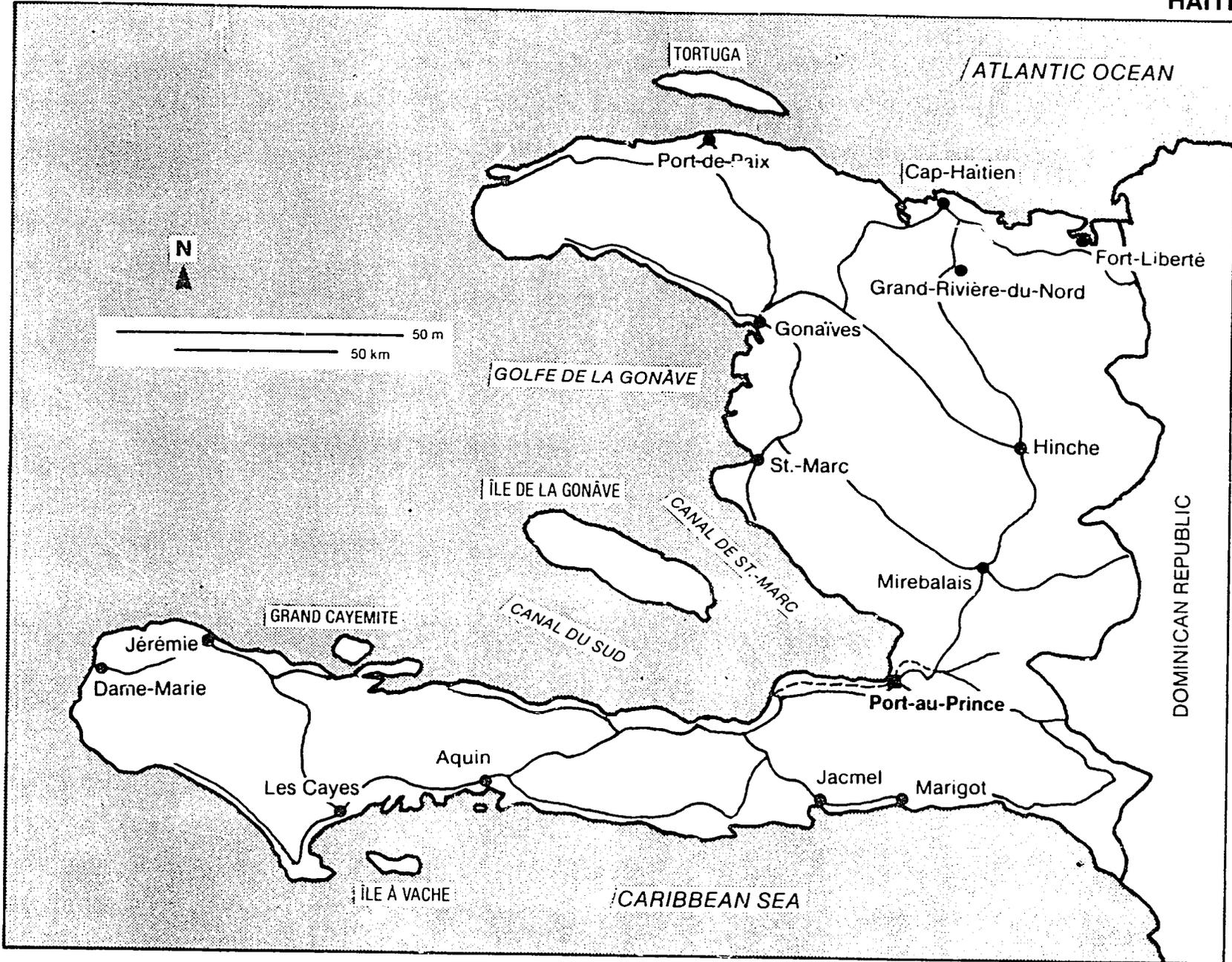


Figure C-5

HAITI

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APPENDIX D

HAITI

COUNTRY BACKGROUND

The Republic of Haiti, which lies west of the Dominican Republic on the island of Hispaniola, covers 27,750 square kilometers. In 1986, with the ousting of its former President-for-life, Haiti entered a period of political and economic instability that continues. It has had seven governments since 1985. The country's financial difficulties have been aggravated by fluctuations in foreign assistance in response to recent political and economic developments. The United States suspended direct assistance to the Government of Haiti when elections were canceled in November of 1987, channeling aid to the country through PVOs and NGOs.

COUNTRY PROFILE	
1990 Population:	5.96 million Urban: 1.67 Rural: 4.29
Population Growth Rate:	Overall: 1.6% Urban: 3.52% Rural: .87%
Infant Mortality Rate:	112
Under 5 Mortality Rate:	162
Mortality Rate due to Infectious and Parasitic Diseases:	N/A
Mortality Rate due to Diarrheal Diseases:	N/A
Life Expectancy:	55
Adult Literacy:	62%
GNP per Capita (1988):	\$380
GNP per Capita Annual Growth from 1965-88:	.4%
Currency:	Gourdes 8 = \$1
Average Annual Inflation from 1980-88:	7.9%

Haiti is the poorest country in the Western hemisphere. Deteriorating living conditions in rural areas have accelerated urbanization. Despite a relatively low population growth rate of 1.4 percent, largely a consequence of widespread emigration, Haiti's population has outstripped domestic food production (FAO).

Immunization coverage is poor and diseases preventable by vaccination are widespread. Infectious and parasitic diseases (often spread through water) are the leading causes of morbidity and mortality. Diarrhea is the most prevalent communicable disease. Malaria and AIDS are major public health priorities along with malnutrition. A substantial portion of financing for health services comes from external donors, rendering these services susceptible to fluctuations in aid.

Access to water and sanitation facilities is inadequate, contributing to the poor health and hygiene of many Haitians. Both urban and rural areas face a serious deficiency in waste disposal systems. The system in Port-au-Prince can absorb only one-fourth of the waste produced daily (FAO). Haiti's sanitation bureau is developing an environmental sanitation code. There has been no legislation previously.

The Autonomous Metropolitan Drinking Water Center (CAMEP) and the National Drinking Water Service (SNEP)—divisions of the Ministry of Public Works, Transportation, and Communications—are responsible for water and sanitation services in metropolitan centers. An agency within the Ministry of Public Health, the Community Drinking Water Agency (Post Communautaire d'Hygiène Publique et d'Eau Potable) (POCHEP), provides services to rural communities. The Sanitation and Sewerage Agency (Service du Genie Sanitaire et l'Assainissement) within the Ministry of Public Health (Direction d'Hygiène Publique—DHP/SGA) also has a role in the sector.

COVERAGE LEVELS AND INVESTMENT

Current Projects

Haiti receives support for water and sanitation activities from a number of multilateral and bilateral donors. In 1990, seven agencies (A.I.D., IDB, KfW, CARE, PAHO, UNICEF, and the World Bank) were assisting the sector, and CIDA is exploring opportunities to make a contribution. Haiti should be able to make substantial progress in the development of water and sanitation facilities over the next five years. But the magnitude of its needs will require sustained assistance for many years more if satisfactory levels of coverage are to be reached.

- **A.I.D.**

A.I.D.'s ongoing Voluntary Agencies for Child Survival (VACS) Project contains a \$1 million component for a three-year program in support of NGO water activities in rural communities. It has no other plans for the sector.

Total committed funding to increase coverage: \$1,000,000

- **IDB**

The IDB's Community Health Post and Rural Drinking Water Supply Program is in the second phase of implementation and will end in late 1992. Originally scheduled for completion in 1991, the six-year project is constructing 70 water systems to serve about 110,000 persons in 100 villages. It is being executed by POCHEP and is financed by an \$8.8 million IDB loan and \$1.1 million in counterpart funds. The IDB loan also provides technical assistance to strengthen POCHEP's institutional capabilities and to train water system operators. Part of the loan is supporting studies and designs for the third phase, which may be approved in early 1992. This phase will finance the construction of about ninety small systems in rural areas. IDB is also providing technical assistance to SNEP in its project to rehabilitate seven intermediate cities.

Another IDB loan is financing Phase II of the ongoing Port-au-Prince Storm Drainage Project, which is rehabilitating the storm sewer system, expanding the solid waste disposal system, and initiating erosion control measures to improve environmental health conditions for approximately 700,000 residents of the capital. The project, begun in 1989 and to be completed in 1992, is funded by a \$51.8 million IDB loan and \$5.7 from the national government. These funds are not included in the investment analysis, because the project will not directly increase or improve access to user facilities.

Total committed funding to increase coverage: \$2,600,000

- **KfW**

The KfW is providing approximately \$16.3 million in grants for seven water supply and sanitation projects, the largest of which, WS&S III, is in the region of Estère Desdunes. This \$4.65 million project is supported by a \$3.87 million grant from Germany and \$780,000 in counterpart funds.

WS&S I, II, and IV are rehabilitating or constructing water and sanitation systems throughout the country. WS&S I funds rehabilitation and studies on water and sanitation in Gonaïves and St. Marc. WS&S II provides additional support for these and also funds hydrological investigations, feasibility studies, and engineering for water and sanitation systems in eight provincial towns, and drilling equipment and connections to four wells in Cité Soleil and Cap Haïtien. WS&S IV supports sanitation measures in Gonaïves, St. Marc, and Cap Haïtien. Projects I and II are being executed by SNEP, III and IV jointly by SNEP and the DHP.

A fifth project, WS&S V, is in the planning stage. If approved, it will provide about \$4.7 million for the rehabilitation and extension of the water supply system in Cap Haïtien. In addition to these projects, the KfW supports the sector through its Studies and Experts Funds. Three studies, with a total of \$1.86 million in funding, are ongoing.

<u>Project</u>	<u>KfW Funds</u>	<u>GOH</u>	<u>IBRD</u>	<u>Total</u>
WS&S I	\$3.33 M	.40 M	.26 M	3.99 M
WS&S II	\$4.58 M	—	—	4.58 M
WS&S III	\$3.87 M	.78 M	—	4.65 M
WS&S IV	\$2.67 M	.97 M	—	3.64 M
Exp. Fund I	.67 M	—	—	.67 M
Exp. Fund II	.48 M	—	—	.48 M
Exp. Fund III	.71 M	—	—	.71 M
TOTAL	\$16.31 M	2.15 M	.26 M	18.72 M

WS&S II, III and IV finance activities that will directly increase water and sanitation coverage. Estimated outstanding disbursements under these three projects have been included in the funding analysis.

Total committed funding to increase coverage: \$4,873,000

- **CARE**

CARE is implementing "de l'eau du peuple" project, or DLOPEP, to give its Creole acronym, to develop water supply systems and latrine construction programs in approximately 40 rural communities serving approximately 75,000 people, and to provide some technical assistance and management support to 35 other community managed water systems benefiting another 120,000 people. Participants are also trained in improved hygiene and sanitation practices. Project total cost, over a five year period starting June 1990, is estimated at \$12 million. USAID has provided \$543,000 (prior to September 29, 1991) to supplement CARE's \$607,000 commitment to the project to date. CARE is actively raising funds to continue the project. About 43 percent of projected costs will be allocated to expanding coverage and the balance will go to management, education, and training costs.

Total committed funding to increase coverage: \$1,150,000

- **CIDA**

CIDA is considering support for the Centre d'Etudes et Cooperation International (CECI), a Canadian nonprofit organization that has constructed water projects in cooperation with a Haitian NGO. But no funds have been committed as yet.

Total committed funding to increase coverage: \$0

- **PAHO**

PAHO has committed \$750,000 in technical assistance to SNEP and CAMEP for developing and implementing sector projects and promoting community participation.

Total committed funding to increase coverage: \$0

- **UNICEF**

UNICEF has contributed more than \$1 million to a program that is in its last year. The rural component, in the valleys of Artibonite and Léogâne, has involved spring capping, the drilling of more than 400 wells, the installation of more than 600 water pumps, and latrine construction. Community committees have been given the responsibility for installing and maintaining the facilities. In Léogâne, integrated basic services provide primary health care and early childhood education.

The urban component, concentrated in the vicinity of Port-au-Prince, includes the installation of water fountains, the construction of latrines, and the paving of streets to improve the insanitary conditions resulting from stagnant water and open sewage canals.

Program funds, of which approximately \$120,000 remains to be expended in 1991, contain a small amount for education and health and for upgrading existing facilities.

UNICEF plans to expand its activities in the coming years but no funding has been provided as yet.

Total committed funding to increase coverage: \$100,000

- **World Bank**

The World Bank has provided a \$20 million loan for a project to rehabilitate and improve water services in Port-au-Prince and its environs. The \$32.5 million project, for which CCCE, the French economic development agency, is providing \$10 million in cofinancing and the Haitian government is contributing \$2.5 million, will develop new water sources, install new networks and connections, train the staff of CAMEP, which is executing the project, and provide technical assistance for the implementation and design of subprojects. The five-year project, which began in 1989, is in the bidding and bid evaluation phase and little funding has been disbursed. Studies for a potential follow-up project to improve water services in surrounding communities like Pétionville are also underway.

Since the Port-au-Prince project focuses on rehabilitation, improvements, and institutional development, only 10 percent of the estimated disbursements are included in this analysis of funds to expand coverage.

Total funding committed to increase coverage: \$3,000,000

Current Coverage

About 55 percent of the urban population, or 920,000 persons, have adequate access to water, and 43 percent, or 720,000 persons, to sanitation services. Levels of coverage for rural areas are substantially lower: only 33 percent, or 1.4 million persons, have access to water, and 16 percent, or 690,000 persons, to sanitation. Progress over the past five years has been steady but slow, with 338,000 persons gaining access to water supply services and 303,000 gaining access to sanitation. During the same period, however, Haiti's population has increased by 664,000. These five-year trends are shown in Tables and Figures D-1 and D-2.

Overall, only 39 percent of Haitians have adequate access to water and 24 percent to sanitation services. It is not surprising that infectious and parasitic diseases, often communicated through contaminated water and unhygienic sanitation facilities, are widespread.

Meeting the 1995 Urban Water and Sanitation Targets

The nearly \$8 million (\$4.8 for water and \$3.1 for sanitation) committed to urban sector development is the largest donation made to the countries in this report. Unfortunately, it falls far short of the needs of a country that also has the most deficient sanitary conditions in the region.

The five-year targets, shown in Tables D-1 and D-2 and Figures D-4 and D-5, call for raising access to water from 55 percent to 64 percent, and access to sanitation services from 43 percent to 52 percent. Based on current population growth rates, this will mean water services for 351,000 and sanitation services for 312,000 more urban dwellers. As shown in Table and Figure D-3, these increases will require the investment of approximately \$69 million (\$55 million for water services and \$14 million for sanitation). With only \$8 million committed, Haiti must raise the balance of \$61 million.

Meeting the 1995 Rural Water and Sanitation Targets

At 16 percent, rural sanitation coverage is the lowest in the region. Although the 1995 goals look ambitious in numbers of persons (606,000 more with access to water and 654,000 to sanitation), they are still disconcertingly low, amounting to only 45 percent coverage in water and 30 percent coverage in sanitation.

Table D-3 shows the estimated funding required: \$36 million for water and \$19 million for sanitation. Current commitments of \$4 million for water and \$404,000 for sanitation fall far short of this amount, leaving Haiti with a deficit of \$31 million for water services and \$19 million for sanitation. Figure D-3 illustrates the shortfalls.

TABLE D-1**Actual Water Supply Coverage vs. Targets**

WATER SUPPLY									
YEAR	TOTAL POP.	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POP. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POP. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POP. SERVED	% OF POP. SERVED
1985	5,269	1,992	38%	1,405	826	59%	3,864	1,166	30%
1989	5,866	2,123	36%	1,600	870	54%	4,266	1,253	29%
* 1990	5,960	2,330	39%	1,670	920	55%	4,290	1,410	33%
TARGETS FOR 1995	6,465	3,287	51%	1,985	1,271	64%	4,480	2,016	45%

Population figures are rounded to the nearest thousand.

TABLE D-2**Actual Sanitation Coverage vs. Targets**

SANITATION									
YEAR	TOTAL POP.	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POP. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POP. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POP. SERVED	% OF POP. SERVED
1985	5,269	1,107	21%	1,405	592	42%	3,864	515	13%
1989	5,866	1,127	19%	1,600	607	38%	4,266	520	12%
* 1990	5,960	1,410	24%	1,670	720	43%	4,290	690	16%
TARGETS FOR 1995	6,465	2,376	37%	1,985	1,032	52%	4,480	1,344	30%

Population figures are rounded to the nearest thousand.

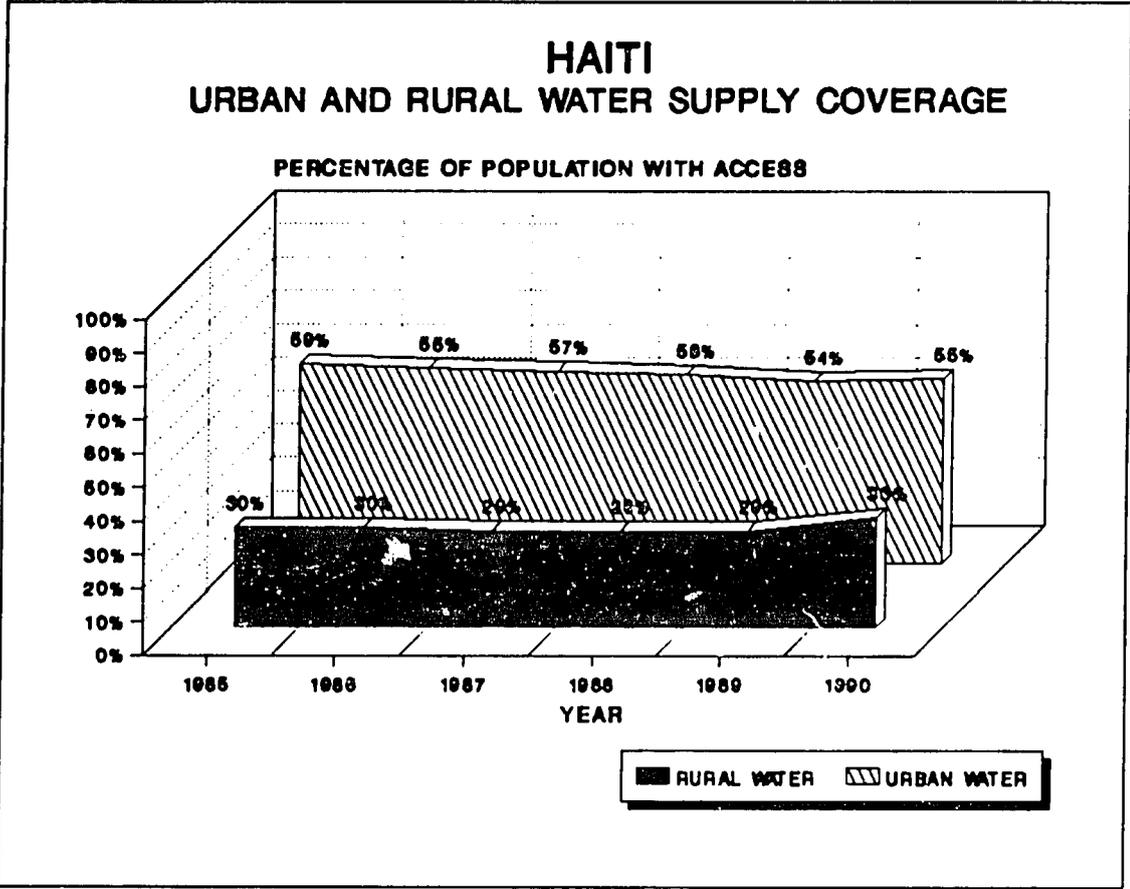


Figure D-1

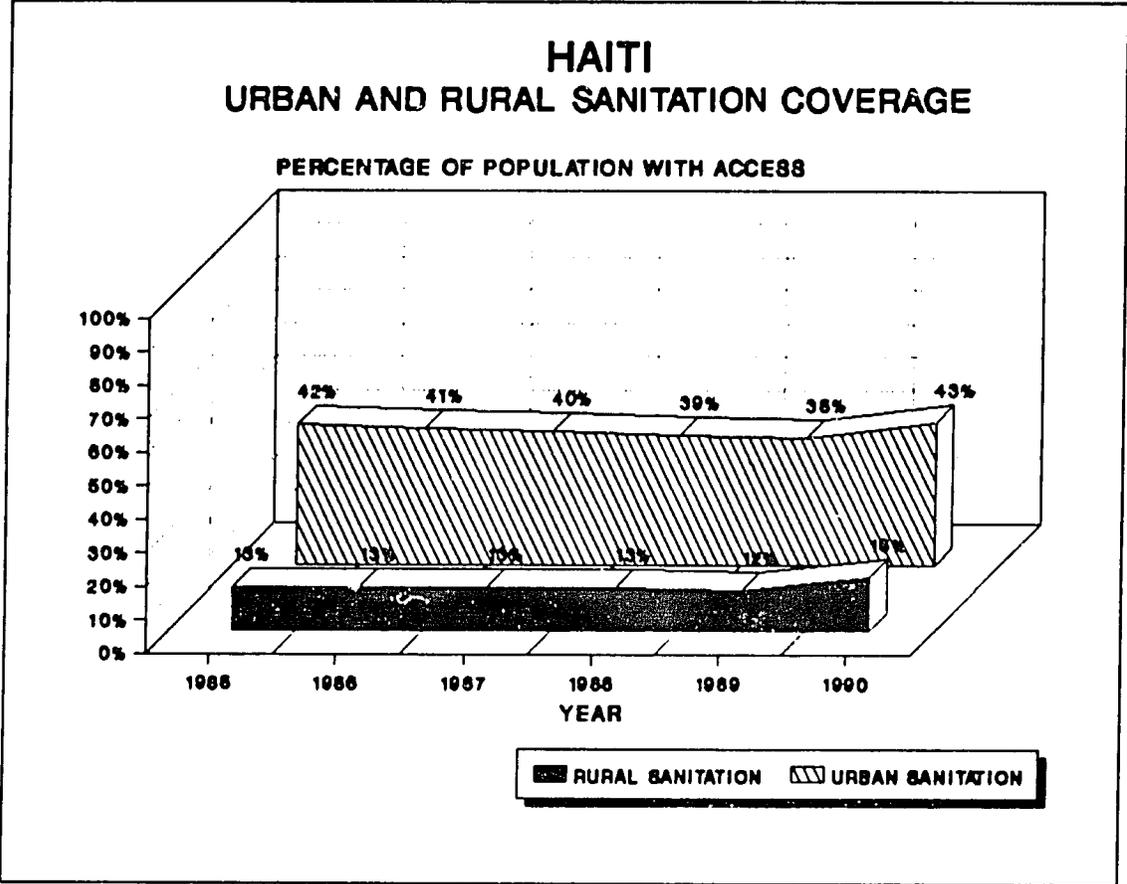


Figure D-2

TABLE D-3

**Investment Needed to Meet 1995 Targets
(1990 US \$000s)**

	WATER SUPPLY COVERAGE (PERSONS—000s)			SANITATION COVERAGE (PERSONS—000s)		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
TARGET FOR 1995 (000s)	3,287	1,271	2,016	2,376	1,032	1,344
COVERAGE IN 1990	2,330	920	1,410	1,410	720	690
REQUIRED INCREASE	957	351	606	966	312	654
ESTIMATED UNIT COST (US \$ PER CAPITA)	N/A	\$156	\$59	N/A	\$46	\$29
ESTIMATED TOTAL COST TO MEET 1995 TARGETS	\$90,510	\$54,756	\$35,754	\$33,318	\$14,352	\$18,966
FIRMLY COMMITTED INVESTMENTS (000s) *	\$9,236	\$4,815	\$4,421	\$3,487	\$3,083	\$404
PROJECTED FUNDING SHORTFALL (\$000s)	\$81,274	\$49,941	\$31,333	\$29,831	\$11,269	\$18,562

TOTAL FUNDING SHORTFALL \$111,105

* Includes only those investments to increase coverage.

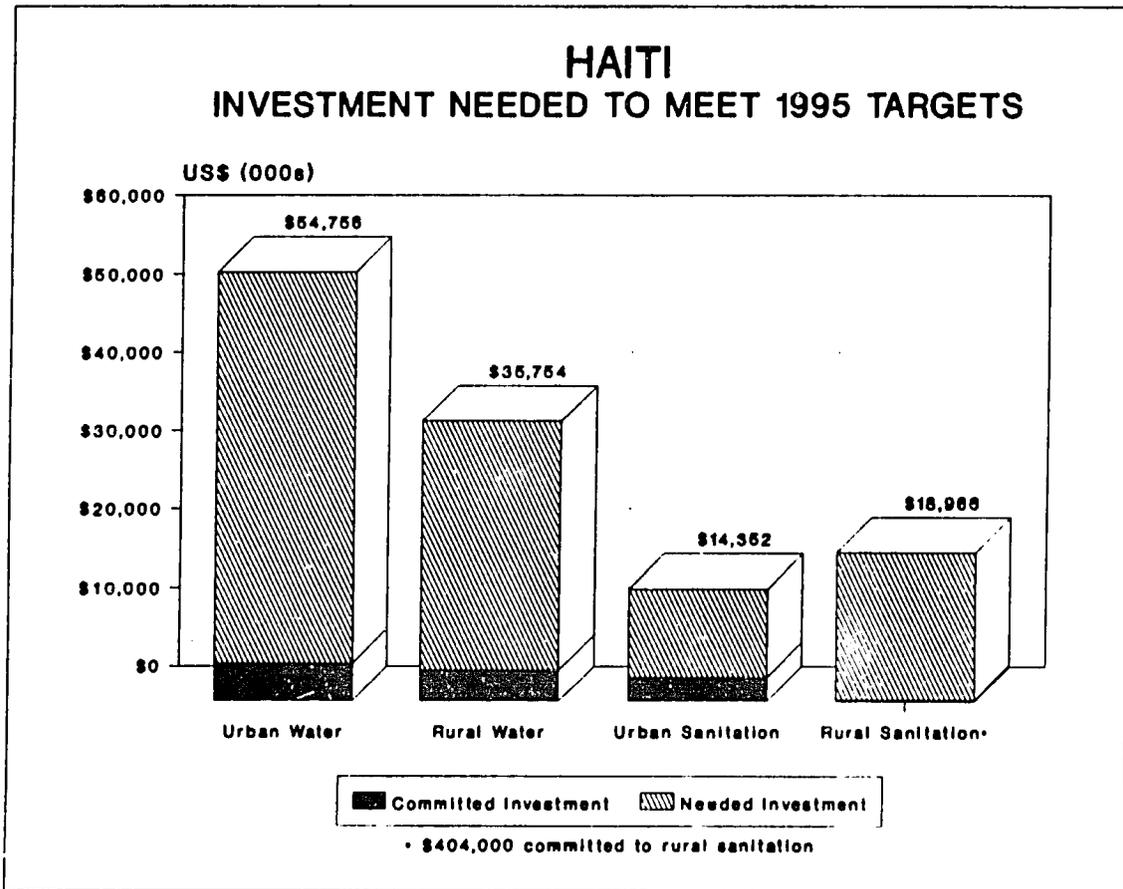


Figure D-3

HAITI

1990 COVERAGE AND 1995 TARGETS (PERCENTAGE OF POPULATION)

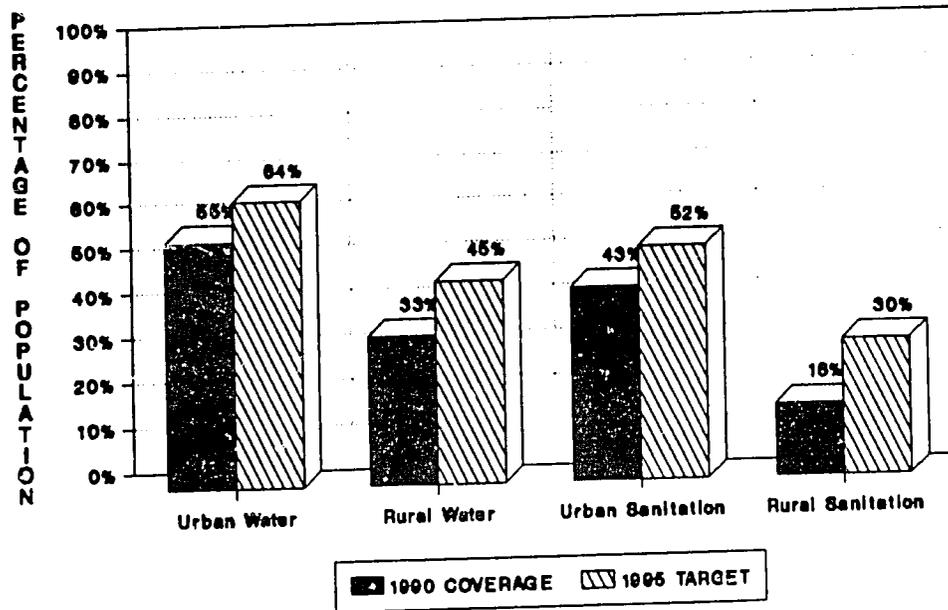


Figure D-4

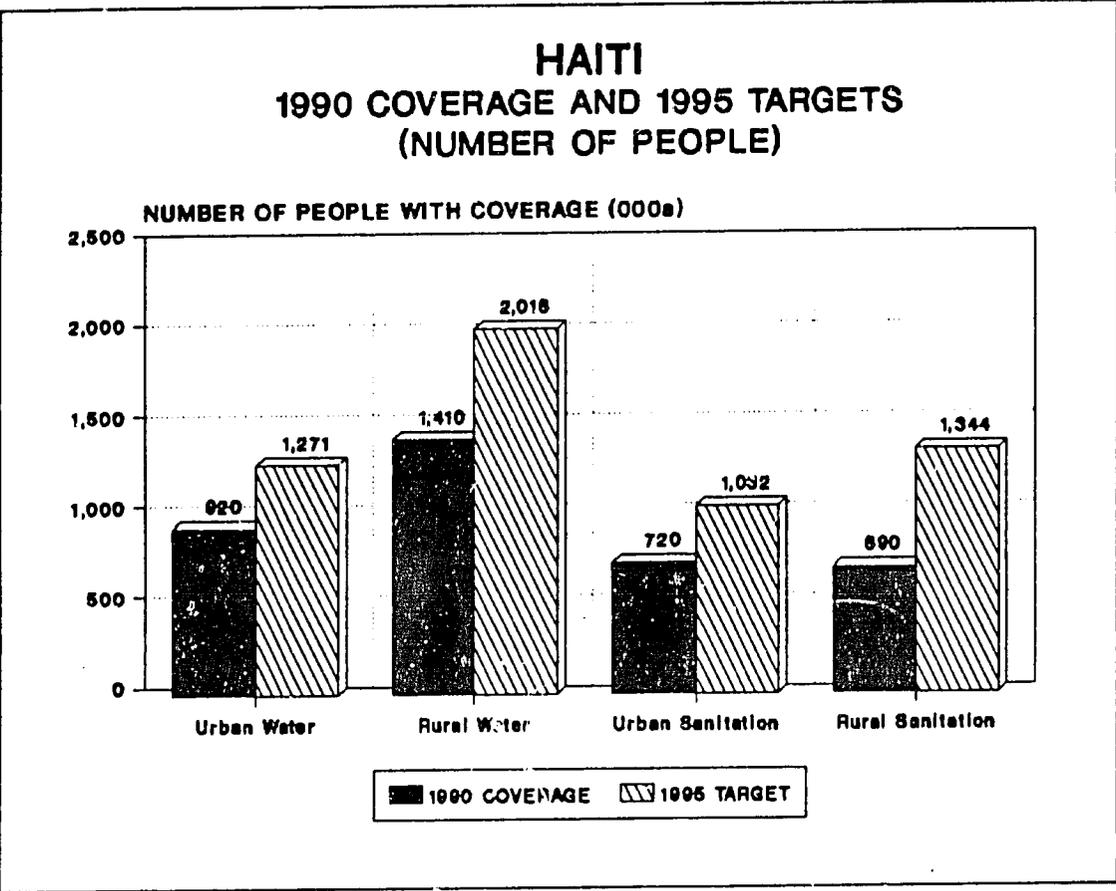
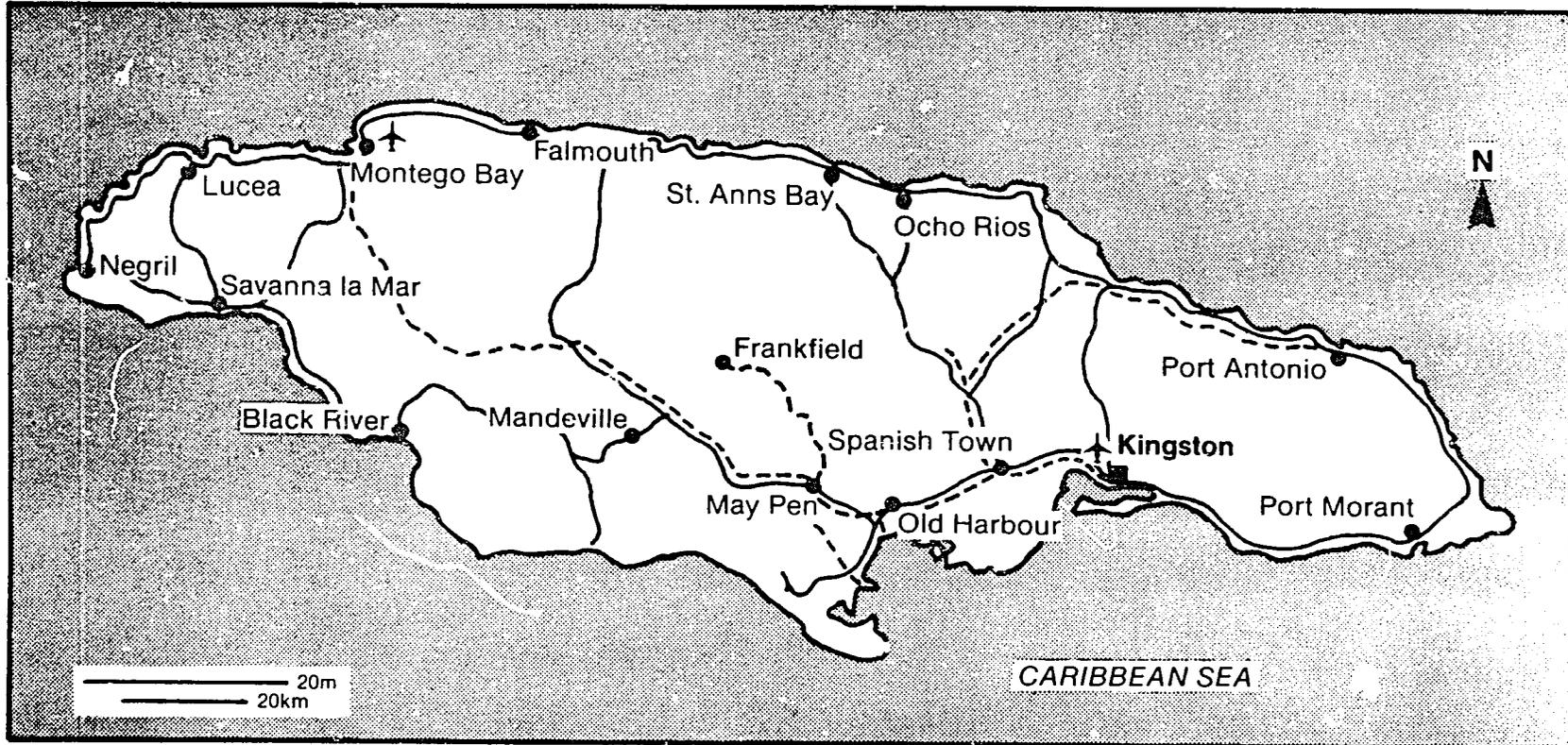


Figure D-5

JAMAICA



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APPENDIX E

JAMAICA

COUNTRY BACKGROUND

Jamaica's 10,991 square kilometers of land make it the third largest island in the Caribbean. The economy, based primarily on agriculture, tourism, and bauxite (aluminum ore) mining, was severely affected by the global economic recession in the early 1980s. In response to the crisis, the Government of Jamaica pursued stringent stabilization and structural adjustment policies, which by 1988 were showing positive results. In that year, however, the economy was severely damaged by Hurricane Gilbert, which dealt setbacks to several key sectors, most notably agriculture, manufacturing, tourism, and housing.

COUNTRY PROFILE

1990 Population:	2.41 million
	Urban: 1.16
	Rural: 1.25
Population Growth Rate:	Overall: .7%
	Urban: 1.8%
	Rural: -.5%
Infant Mortality Rate:	16
Under 5 Mortality Rate:	22
Mortality Rate due to Infectious and Parasitic Diseases:	29.8
Mortality Rate due to Diarrheal Diseases:	22.8
Life Expectancy:	73
Adult Literacy:	96%
GNP per Capita (1989):	\$1,260
GNP per Capita (1988):	\$1,070
GNP per Capita Annual Growth from 1965-88:	-1.5%
Currency:	Jamaican Dollars 8.1= \$1
Average Annual Inflation from 1980-88:	18.7%

More than 40 percent of Jamaica's 2.5 million inhabitants live in the capital city of Kingston and the surrounding area. Heavy urbanization is a continuing trend, but migration and decreasing fertility rates since 1983 have resulted in declining overall population growth. With unemployment at well over 20 percent, it is not surprising that migration is concentrated in the 20- to 59-year-old working age group. About 20 percent of emigrants are highly skilled. Investments in youth training and development programs, however, are attempting to reduce unemployment.

The standard of health is good, with relatively low adult (6.1) and infant mortality (17) rates, and long life expectancy (73 years). The leading causes of death are cerebrovascular and heart disease; deaths from infectious or parasitic diseases are few. Among children under five years, however, diarrheal diseases rank second as a cause of death (after conditions originating in the perinatal period). Other major health problems are malnutrition and nutrition-related diseases.

Access to water and sanitation facilities is reported at close to 100 percent. However, increasing demand and difficulties with saline groundwater and droughts are a problem.

Growth in the tourist industry, the largest source of foreign exchange, has also placed a substantial burden on water supplies.

In recent years, the government, working with PAHO and other agencies, has established a water quality monitoring network that has improved the quality of the water supply. Despite this, pollution is still a problem. According to PAHO, only 38 percent of Jamaica's 102 sewerage treatment plants are operating satisfactorily. Solid waste disposal is also poorly managed.

Responsibility for domestic water supplies and sewerage was transferred from the Ministry of Public Utilities and Transport to the Ministry of Local Government (MLG) in 1987. The National Water Commission (NWC), a division of the MLG, is responsible for management and planning in the sector. Other agencies with a role in policy and planning are the Ministry of Agriculture, the Ministry of Construction, the Urban Development Corporation, the Ministry of Planning, Development and Production, and the Caribbean Engineering Company, Ltd. Decisions on major water and sanitation investments are made by the cabinet.

COVERAGE LEVELS AND INVESTMENT

Current Projects

A.I.D., the IDB, the World Bank, and the European Community are the four principal donors in the water and sanitation sector, providing more than \$50 million for projects to rehabilitate, improve, and expand services on the island. PAHO is providing technical support in several areas. Most ongoing projects are near completion. A.I.D., the IDB, the World Bank, and Japan's Overseas Economic Cooperation Fund are considering future assistance.

- **A.I.D.**

A.I.D. has two ongoing water and sanitation projects. Approximately \$5 million in Housing Guarantee loans has been allocated to the Jamaica Shelter and Urban Services Policy Program for the construction of water and sewerage connections, communal water system development, shelter-related and off-site water and sanitation infrastructure development, water loss management, and minor water scheme development. The program, under the National Water Commission (NWC), in cooperation with the Ministry of Construction (Housing) and the Urban Development Corporation (UDC), will run through 1991 and is expected to benefit more than 20,000 families.

The second project is the Inner Kingston Development Project, which is being implemented by the UDC and was begun in September 1988. A loan of \$4.17 million is being used to rehabilitate the central sewerage infrastructure in downtown Kingston. This will improve the trunk sewer systems in the Harbour Street corridor, replace approximately 10,000 feet of sewer lines in selected development areas, and replace approximately 35,000 feet of water mains. These improvements are intended to promote commercial and industrial development in the area. Construction was started in 1990.

A.I.D. is collaborating with Japan's Overseas Economic Cooperation Fund on the North Coast Development Project, which is now in the design stage. Approximately half of the \$80 million project will support water and sewerage improvements in key tourist areas. There will be five subprojects: Montego Bay sewerage treatment facility expansion; Montego Bay South gully improvement; Negril water supply system improvement; North Coast highways development; and Ocho Rios port expansion. Project design and funding commitments for the project should be concluded during 1991.

A.I.D. also plans to support a privatization analysis of the NWC this year.

WASH has included 10 percent of the estimated remaining funds of the two ongoing projects in the investment analysis.

Total funding committed to increase coverage: \$300,000

- **IDB**

The IDB has provided a \$10.8 million loan, with \$5 million from the GOJ for the Mandeville Water Supply Project, which is extending distribution lines and installing additional house connections. The project, which began in 1978, is winding down, with the final disbursement due in February 1991. An estimate of outstanding funds is included in the analysis.

A second project, still in the early stages of design and to be implemented by the NWC, will install house sewerage connections throughout the island.

Total funding committed to increase coverage: \$500,000

- **PAHO**

PAHO is working to improve laboratory capabilities for water quality control and is providing technical support in several areas, including a water quality network, field management of

water and sewerage programs, water and sewerage information systems, and an environmental health program.

Total funding committed to increase coverage: \$0

- **World Bank**

A \$9 million World Bank loan, supplemented by \$3 million from the GOJ, is financing a \$12 million project to support the NWC, provide technical assistance to rehabilitate water supply and sewerage systems in Kingston, and purchase maintenance equipment. Although activity is concentrated in Kingston, maintenance work has been conducted throughout the island. At the end of 1990, approximately \$4 million of the loan remained to be disbursed.

The GOJ has requested the World Bank to finance a follow-on project for wastewater and pollution control, focusing on Kingston Harbor. The project would involve the extension and rehabilitation of sewerage lines, as well as improvements in waste treatment and disposal. No funding has been committed.

Total funding committed to increase coverage: \$0

- **EEC**

The EEC is providing \$26 million to support sewerage infrastructure development in the coastal areas of Negril and Ocho Rios. The five-year project, which began in 1990, will contribute only partially to increased coverage. Detailed design studies and project implementation procedures are being developed by the NWC in cooperation with the Caribbean Engineering Company, Ltd. The preparation of feasibility studies was supported by A.I.D. Because this project will focus on improvements and rehabilitation, only 10 percent of the remaining funds have been included in the analysis.

Total funding committed to increase coverage: \$2,080,000

Current Coverage

About 97 percent of Jamaicans have adequate access to water supply and sanitation facilities. The disparity in urban and rural coverage is relatively small: 99 percent versus 93 percent. Water supply service has stagnated at 97 percent for the past five years, while access to sanitation facilities has increased from 92 percent to 97 percent. The expansion of sanitation services, concentrated in urban areas, largely reflects efforts to increase connections to the public sewerage system.

Water-related diseases are not widespread. Major problems are water shortages as a result of droughts and inadequate rationing, and pollution from industrial and residential waste. Like many neighboring countries, Jamaica is upgrading and rehabilitating existing systems, which are environmentally unsound and unable to meet increased demand. This task will require substantial capital and human resources.

The 1995 targets have been recalculated on the basis of updated coverage data.

Meeting the 1995 Urban Water and Sanitation Targets

The percentage goals for urban sector development—99 percent for both water and sanitation—are the same as current coverage levels. At current population projections, this will mean providing both water and sanitation services to 137,000 more urban residents (Tables E-1 and E-2). Target levels are compared with 1990 coverage in Figures E-4 and E-5. This level of expansion will cost nearly \$36 million (\$18 million for each subsector). Commitments to expand services total \$2.9 million (\$1.6 for water and \$1.3 for sanitation). The resulting shortfall of \$33 million may be offset by funding from the World Bank, A.I.D., Japan, and the IDB. Table and Figure E-3 show investment needs and shortfalls.

Meeting the 1995 Rural Water and Sanitation Targets

The rural population has declined by 81,000 since 1985 as a result of escalating urbanization and falling birth rates. Despite the shrinking population, water supply coverage has been reduced from 94 percent to 93 percent, and sanitation coverage has increased only slightly from 91 percent to 93 percent. Historical coverage trends are shown in Tables and Figures E-1 and E-2. In anticipation of continuing population outflows, the WASH targets require water and sanitation coverage for 928,000 rural residents, a reduction from the current 941,000 persons covered (see Figure E-5). This figure, based on the projected 1995 rural population, represents a 1 percent increase over 1990 coverage.

As illustrated in Figure E-3, Jamaica does not need to invest in the expansion of rural water and sanitation to achieve the WASH targets. But substantial investments are necessary for rehabilitation and repairs and the upgrading of the existing network, which includes many minimally acceptable systems.

TABLE E-1**Actual Water Supply Coverage vs. Targets**

WATER SUPPLY									
YEAR	TOTAL POP.	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POP. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POP. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POP. SERVED	% OF POP. SERVED
1985	2,326	2,248	97%	1,233	1,221	99%	1,093	1,027	94%
1989	2,466	2,381	97%	1,464	1,449	99%	1,002	932	93%
1990	2,493	2,407	97%	1,481	1,466	99%	1,012	941	93%
TARGETS FOR 1995	2,606	2,531	97%	1,619	1,603	99%	987	928	94%

Population figures are rounded to the nearest thousand.

TABLE E-2**Actual Sanitation Coverage vs. Targets**

SANITATION									
YEAR	TOTAL POP.	ALL AREAS		URBAN AREAS			RURAL AREAS		
		POP. SERVED	% OF POP. SERVED	TOTAL URBAN POP.	POP. SERVED	% OF POP. SERVED	TOTAL RURAL POP.	POP. SERVED	% OF POP. SERVED
1985	2,326	2,142	92%	1,233	1,147	93%	1,093	995	91%
1989	2,466	2,323	94%	1,464	1,391	95%	1,002	932	93%
1990	2,493	2,407	97%	1,481	1,466	99%	1,012	941	93%
TARGETS FOR 1995	2,606	2,531	97%	1,619	1,603	99%	987	928	94%

*Population figures are rounded to the nearest thousand.
Coverage estimates provided by PAHO.*

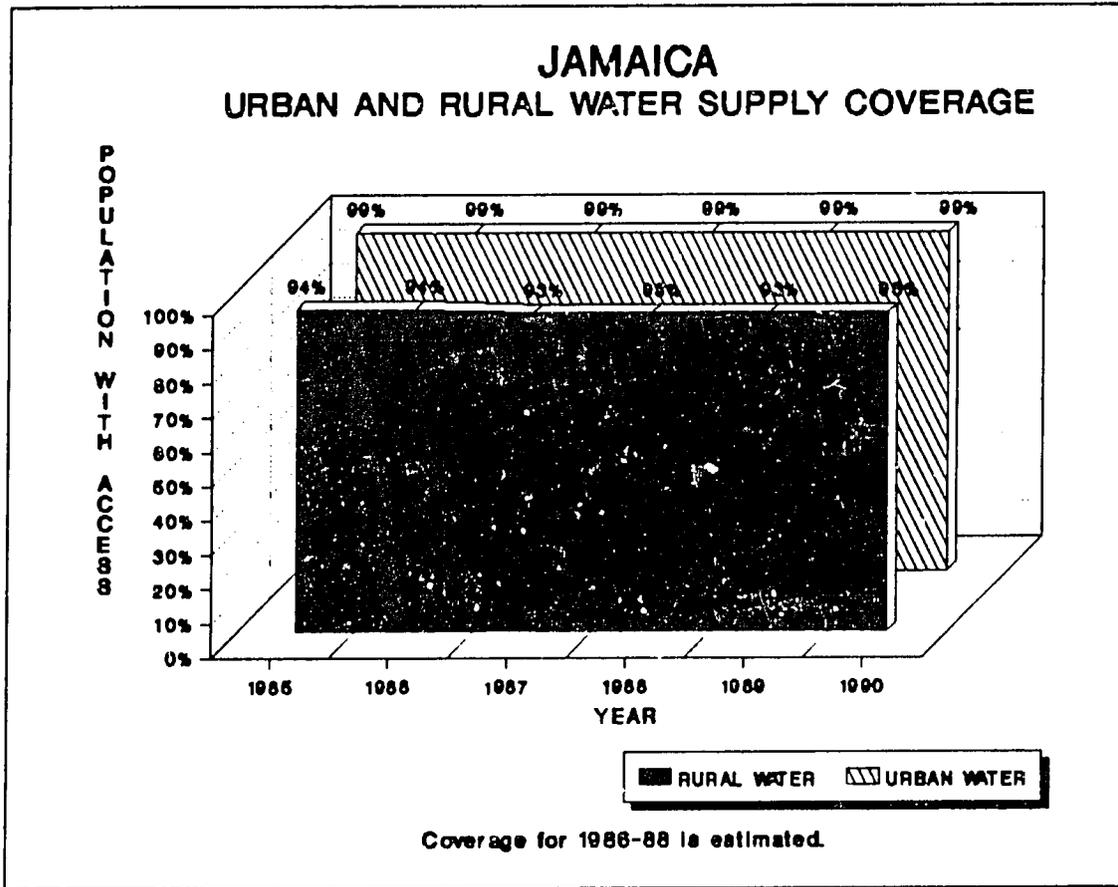


Figure E-1

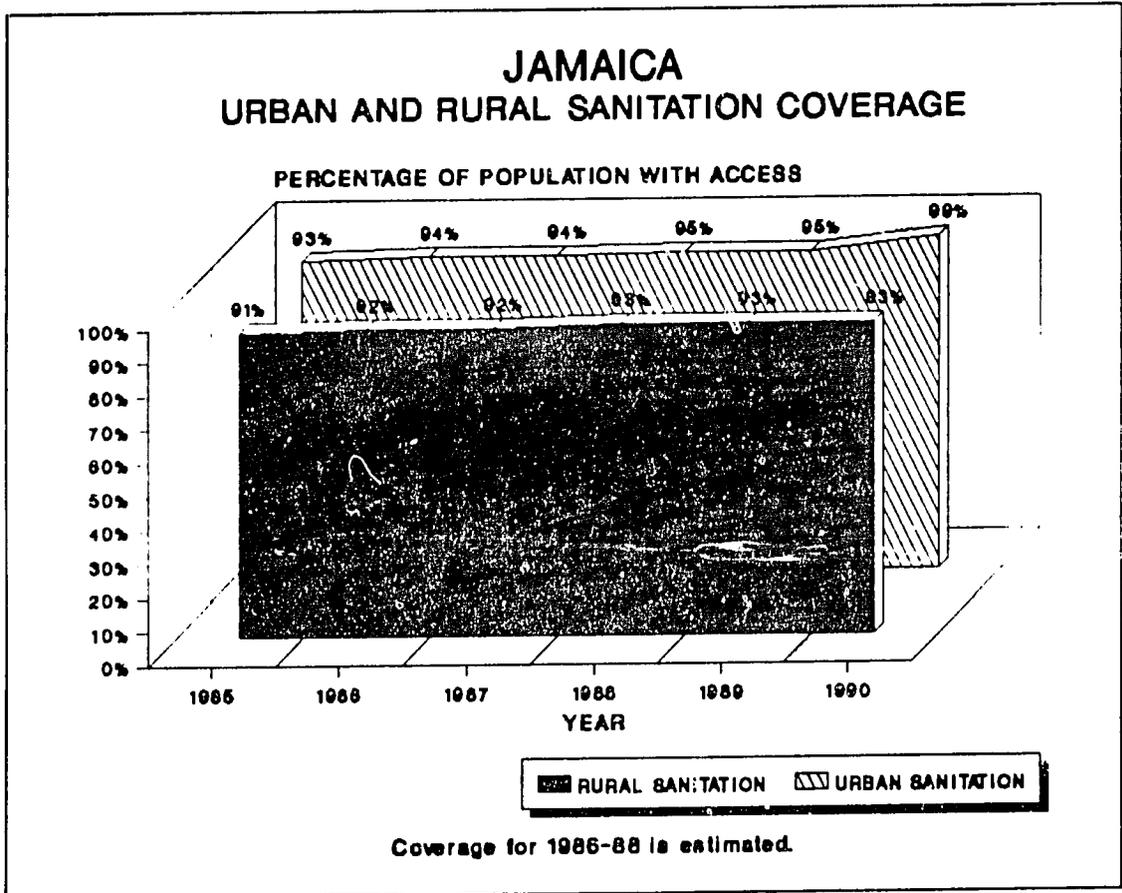


Figure E-2

TABLE E-3

**Investment Needed to Meet 1995 Targets
(1990 US \$000s)**

	WATER SUPPLY COVERAGE (PERSONS—000s)			SANITATION COVERAGE (PERSONS—000s)		
	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL
TARGET FOR 1995 (000s)	2,531	1,603	928	2,531	1,603	928
COVERAGE IN 1990	2,407	1,466	941	2,407	1,466	941
REQUIRED INCREASE	124	137	(13)	124	137	(13)
ESTIMATED UNIT COST (US \$ PER CAPITA)	N/A	\$131	\$53	N/A	\$131	\$53
ESTIMATED TOTAL COST TO MEET 1995 TARGETS	\$17,947	\$17,947	\$0	\$17,947	\$17,947	\$0
FIRMLY COMMITTED INVESTMENTS (000s)*	\$1,590	\$1,590	\$0	\$1,290	\$1,290	\$0
PROJECTED FUNDING SHORTFALL (\$000s)	\$16,357	\$16,357	\$0	\$16,657	\$16,657	\$0

TOTAL FUNDING SHORTFALL \$33,014

* Includes only those investments to increase coverage.

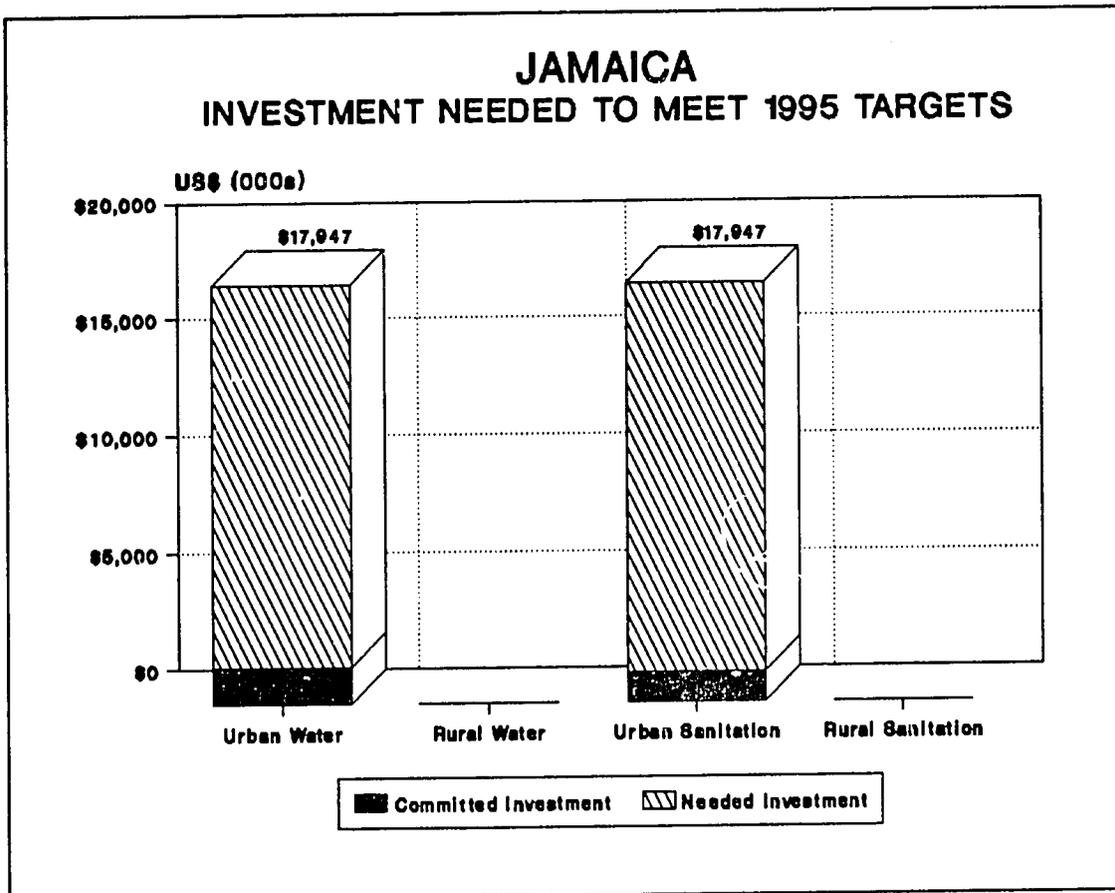


Figure E-3

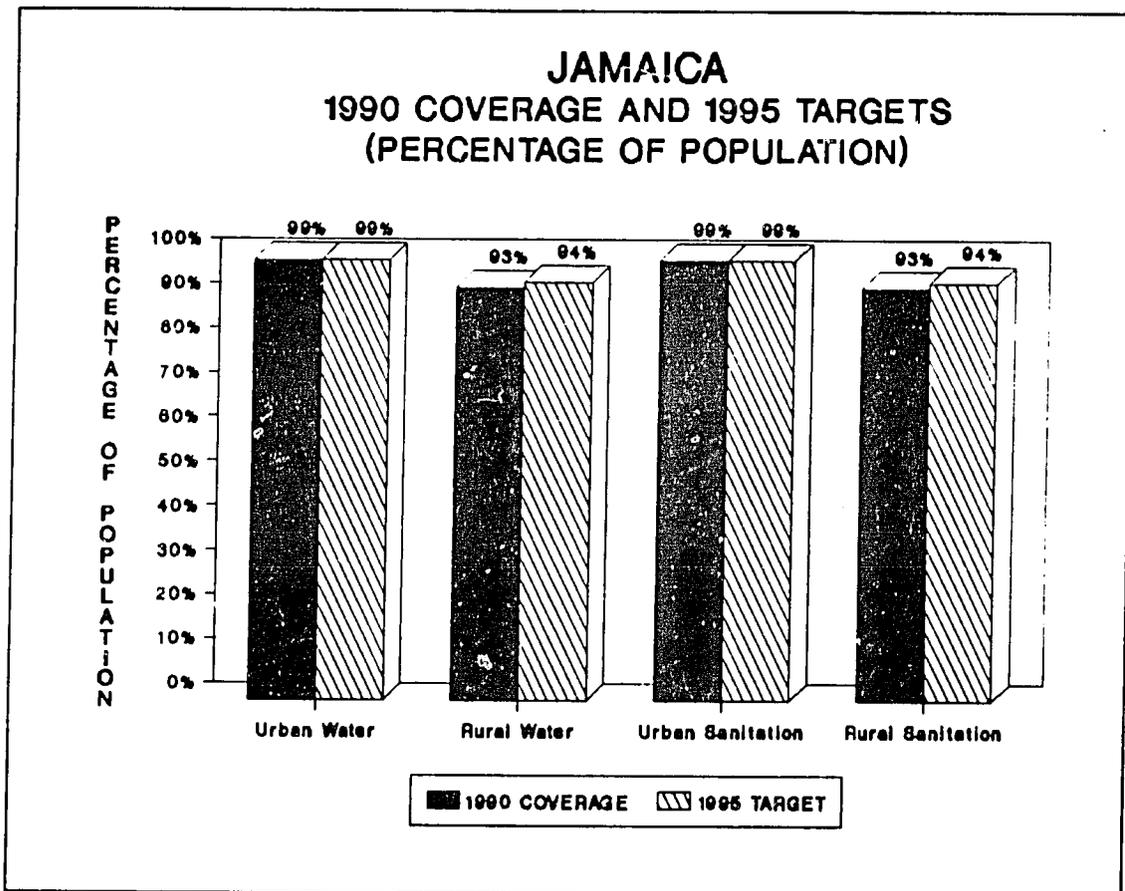


Figure E-4

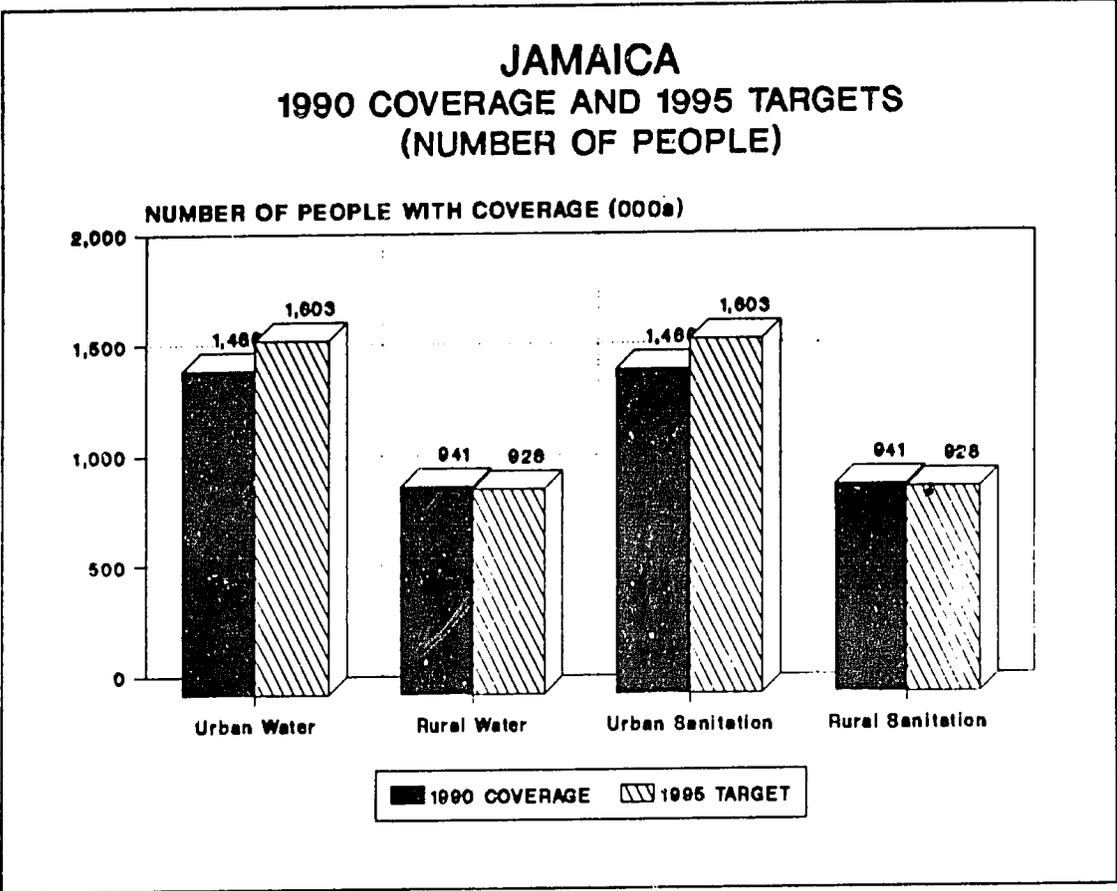


Figure E-5