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THE FINANCIAL DEMANDS OF THE INTERNATIONAL DRINKING WATER
SUPPLY AND SANITATION DECADE IN LATIN AMERICA

80-12-2724

CONTENTS

Summary and principal conclusions

1. The purpose of this study is to investigate "the sources of investment required for the programmes prepared for the Decade and the form in which internal resources can be channelled for that purpose, as well as whatever financial surpluses may be available"; as requested by the Sessional Committee on Water at the eighteenth session of CEPAL.

2. The investigation has been based on the following sequence of analysis:

(a) Establish the provision in 1977 of water supply and sanitation in each country for the urban and rural population;

(b) Establish recent trends in the provision of service and consequent amounts of investment separately for water supply and sanitation for both the urban and rural populations, country by country;

(c) Establish the provision of service for the period 1977-1990 on the basis of (i) the announced or expected goals to be adopted by governments, and (ii) 100% access of both the urban and rural population to a reliable source of drinking water and adequate excreta disposal;

(d) Estimate the levels of investment required by the two goals for future service in water supply and excreta disposal;

(e) Evaluate the possibility of financing the two estimates of investment in water supply and excreta disposal established in the study for the countries of the region;

(f) Establish the possible sources of finance.

3. The population to be provided with service in Latin America for the period 1977-1990 is estimated at between 171 and 296 million in the case of water supply and 226-298 million in the case of adequate excreta disposal. The urban/rural breakdown is as follows:

	Urban (Thousands)	Rural
Water supply	128 764 - 181 026	42 368 - 115 217
Excreta disposal	130 194 - 213 142	46 355 - 85 015

The range depends on the coverage goals adopted, with the higher figure representing the provision of service to the whole population.

4.   The investment costs of the provision of new services have been estimated
on the basis of two sets of costs for new connexions to water supply and
sewerage systems or for the construction of wells, latrines and other devices.
The total investment required, in the period 1977-1990, in the region varies
from a minimum of US$ 36 billion, with less than complete coverage and using
the lower of the two estimates of connexion costs, to a maximum of
US$ 61 billion, with complete coverage of the population with adequate
services and the higher estimate of connexion costs.

5.   The annual investment estimated for the Decade would range from US$ 2.76
to 4.69 billion compared with an estimated average annual investment of some
US$ 2 billion during 1970-1977.

6.   Possible future levels of investment in water supply and excreta disposal
have been estimated on the basis of the relationship between gross national
product and the level of provision of water supply and sanitation. On the
basis of a relatively simple regression of past levels of water supply and
sanitation against the per capita gross national product, the level of
provision to be expected at the end of the Decade was estimated separately
for urban water supply, urban sanitation, rural water supply and rural
sanitation. Two estimates of the future growth in national income were taken
from a recent CEPAL study of the development prospects of Latin America in
the 1980s. From the comparison of the results of this analysis with the
goals established for the Decade various observations can be made on the
continued maintenance of the historical relationships of the sector within
the economies of the countries of the region:

(i) most countries would be able to achieve the goals they have
established for urban drinking water supply, although falling short of
complete coverage;

(ii) only a few countries could achieve the goals they have set
themselves in urban sanitation and rural drinking water supply and none will
achieve complete coverage;

(iii) nearly all countries would be able to realize the goals
established for rural excreta disposal and a good number will be providing
such services to the whole rural population.

7. It can be concluded that continued investment in the sector at past rates will generally not result in the achievement of the goals set by the countries of the region and certainly not in the provision of adequate services to the whole population of the region.

8. If greater resources are to be invested in the sector during the Decade, the bulk of the financing required will have to be found within the countries. From the analysis made in the study it would seem that, in general, the countries of the region with larger or medium-size economies will be capable of generating the required finance. In contrast, with some exceptions the smaller economies will have considerable difficulty unless the overall amount of gross fixed capital formation is raised or a very high proportion is dedicated to the sector.

9. External loans have assisted in the financing of water supply and sewerage investments in the past. In the period 1970-1977, loans received by the region for investment in the sector totalled some US$ 1 700 million but were unevenly distributed among the countries. This sum was equivalent to 8% of the total investment in the sector. If during the next decade this proportion is maintained, then the external contribution would reach a maximum of some US$ 378 million a year compared to 209 million in the 1970s. The pattern of external financing in the past, heavily weighted in favour of a few of the larger countries and of urban water supply and sewerage must change if the goals in the smaller and less-developed countries and for the rural population are to be met. Such a shift in the pattern of lending may be difficult unless the management and operation of the sector is improved in many countries.

10. Finally, it cannot be concluded that financial support or the lack of it is the only element which will determine the successful achievement of the goals of the Decade in the region. Of equal importance is good management, which must include the adoption of stable policies toward the sector, viable long-term strategies for its development, the availability of adequate and trained staff and the development of rational management practices to conserve existing installations and maximize their utility.

The financial demands of the International Drinking Water Supply and Sanitation Decade in Latin America

This investigation of the financial demands of the International Drinking Water Supply and Sanitation Decade was requested by the Sessional Committee on Water at the eighteenth session of CEPAL. The Committee asked CEPAL to increase its participation in the preparations for the International Drinking Water Supply and Sanitation Decade (IDWSSD) through, _inter alia_,

> "the study of the sources of financing for the investment required for the programmes prepared for the Decade and of the form in which internal resources of the countries can be channelled for that purpose, as well as whatever financial surpluses may be available;".

This presupposes a knowledge of the water supply and sanitation investment programmes proposed by each country for the period of the IDWSSD. Once these programmes are known, the levels of investment can be established from:

(a) the difference between the national goal for water supply and sanitation provision in 1990 and provision in 1977; and

(b) the anticipated investment costs of increased services needed to meet the difference between the existing and the proposed levels of service.

In themselves, both these factors are indeterminate as few countries have established goals for national programmes. Similarly, costs are not easily established in the absence of detailed information on existing conditions country by country.

The secretariat has, therefore, prepared its own evaluation of the likely amounts of investment in water supply and sanitation during the next decade so as to be able to reach conclusions on the financing required and the sources from which this finance might be drawn. This investigation has been based upon the following sequence of analysis:

1. Establish the provision in 1977 of water supply and sanitation in each country for the urban and rural population, with an attempt, where possible, to distinguish between the concentrated and dispersed rural population.

2. Establish recent trends in the provision of service and consequent amounts of investment separately for water supply and sanitation for both the urban and rural populations, country by country.

/3. Establish

3. Establish the provision of service for the period 1977-1990 on the basis of (i) the announced or expected goals to be adopted by governments, and (ii) 100% access of both the urban and rural population to a reliable source of drinking water and adequate excreta disposal.

4. Estimate the levels of investment required by the two goals for future service in water supply and excreta disposal.

5. Evaluate the possibility of financing the two estimates of investment in water supply and excreta disposal established in the study for the countries of the region.

6. Establish the possible sources of finance.

Water supply and excreta disposal services in Latin America and the Caribbean in the late nineteen seventies

The Pan-American Health Organization estimated that in 1976, in the region as a whole, some 70% of the urban population lived in a dwelling with a connexion to a centralized water system. In contrast, only 16% of the rural population were so fortunate. At the same time, 40% of the urban population lived in dwellings with connexions to a sewerage system. In the countryside, the proportion of houses connected to sewerage systems was very small. It cannot be concluded, however, that the population not served by centralized systems, particularly in rural areas, does not have adequate water supply or excreta disposal. Neither can it be assumed that the sanitation characteristics presented in this survey of the region provide an accurate and full picture of the situation.

Statistics on water supply and sanitation are unfortunately not collected systematically in most countries of the region except through population or housing censuses. In consequence, for many countries reliable data on water supply and sanitation conditions are ten years old (see tables 1 and 2). More recent data is available only from the Pan-American Health Organization surveys published every three years. Unfortunately, for many countries there exist considerable discrepancies between this information and that of the censuses, as well as from survey to survey. This is less the case with urban water supply but even here there are differences in the proportion of provision reported. In consequence, it is difficult to

/Table 1

Table 1
ACCESS TO WATER SUPPLY CLASSIFIED ACCORDING TO THE FORM OF SUPPLY
(Percentages)

Country		Year	Piped system					Self supply				Total
			Inside house	Within lot but outside house	Less than 100 metres from house	More than 100 metres from house	Subtotal	Well	Rain-water	River	Other and unknown	
Argentina	Total	1960	43.5	3.6	4.4	-	51.6	41.8	-	-	6.7	48.4
	Urban	1960	54.5	3.9	4.5		62.9	33.5	-	-	3.6	37.1
	Rural	1960	7.4	2.3	4.4		14.1	68.9	-	-	16.9	85.9
Bolivia	Total	1976	-	-	-	-	36.8	23.5	0.5	33.5	5.8	63.2
	Urban	1976	-	-	-	-	78.9	6.7	0.2	4.0	10.1	21.1
	Rural	1976	-	-	-	-	7.9	34.9	0.7	53.7	2.8	92.1
Brazil	Total	1970	-	-	-	-	32.8	24.7	-	-	42.4	67.1
	Urban	1970	-	-	-	-	55.0	23.6	-	-	21.4	45.0
	Rural	1970	-	-	-	-	2.5	26.3	-	-	71.2	97.5
Colombia	Total	1973	67.8			2.1	69.9	11.8	2.0	12.9	3.4	30.1
	Urban	1973	88.9			2.5	91.4	2.7	1.4	1.4	3.1	8.6
	Rural	1973	28.8			1.4	30.2	28.4	3.2	34.2	3.9	69.8
Costa Rica	Total	1973	-	-	-	-	69.8	8.0	-	-	22.2	30.2
	Urban		-	-	-	-	-	-	-	-	-	-
	Rural		-	-	-	-	-	-	-	-	-	-
Cuba	Total	1970	40.9		15.4		56.3	33.2		7.9	2.6	43.7
	Urban	1970	60.8		21.8		82.6	14.3		0.9	2.2	17.4
	Rural	1970	3.8		3.6		7.4	68.2		21.1	3.3	92.6
Chile	Total	1970	57.7		13.3		71.0	18.9	-	-	10.1	29.0
	Urban	1970	73.4		16.1		89.5	5.8	-	-	4.7	10.5
	Rural	1970	4.9		4.1		9.0	62.8	-	-	28.2	91.0
Ecuador	Total	1970	20.0	13.4	9.5		42.9	26.1	0.8	22.8	7.3	57.1
	Urban	1970	44.8	28.2	10.4		83.4	3.8	0.4	1.8	10.6	16.6
	Rural	1970	3.0	3.2	8.9		15.1	41.5	1.1	37.3	5.0	84.9
El Salvador	Total	1971	26.4		20.7		47.2	15.3	2.6	33.6	1.3	52.8
	Urban	1971	59.9		27.9		87.8	6.2	0.2	4.9	0.9	12.2
	Rural	1971	2.8		15.7		18.5	21.7	4.3	53.9	1.6	81.5
Guatemala	Total	1973	16.7	8.7	16.9		42.3	27.3	-	27.2	3.2	57.7
	Urban	1973	38.1	20.0	24.3		82.3	9.3	-	3.5	4.9	17.7
	Rural	1973	4.2	2.1	12.6		18.9	37.8	-	41.1	2.2	81.1
Honduras	Total	1974	15.4	17.2	10.5		43.1	29.7	-	26.0	1.1	56.9
	Urban	1974	39.3	36.0	15.2		90.5	5.7	-	2.2	1.6	9.5
	Rural	1974	4.4	8.5	8.4		21.2	40.8	-	37.0	0.9	78.8
Jamaica	Total	1970	16.6	24.4	27.2		68.2	-	-	-	-	31.7
	Urban	1970	33.5	43.3	11.5		88.4	-	-	-	-	11.5
	Rural	1970	2.8	9.0	40.0		51.8	-	-	-	-	48.2
Mexico	Total	1970	38.8	10.6	11.6		61.0	-	-	-	-	39.0
	Urban	1970	54.0	15.8	10.4		80.2	-	-	-	-	19.8
	Rural	1970	17.1	3.4	13.3		33.8	-	-	-	-	66.2
Nicaragua	Total	1971	26.3	6.0	5.2		37.5	31.2	-	25.4	6.0	62.6
	Urban	1971	52.0	11.9	8.0		71.8	18.6	-	2.7	6.0	28.1
	Rural	1971	1.6	0.2	2.5		4.4	43.3	-	47.3	5.1	95.6
Panama	Total	1970	24.2		26.9		51.1	12.2	0.6	13.3	22.8	48.9
	Urban	1970	-	-	-	-	90.7	4.0	-	-	5.3	9.3
	Rural	1970	-	-	-	-	11.9	20.2	-	-	67.9	88.1
Paraguay	Total	1972	-	-	-	-	11.1	80.6		6.7	1.6	88.9
	Urban	1972	-	-	-	-	27.6	67.7		3.2	1.6	72.4
	Rural	1972	-	-	-	-	0.0	89.2		9.1	1.7	100.0
Peru	Total	1972	25.3	4.3	11.8		41.4	9.1		39.8	9.7	58.6
	Urban	1972	43.5	7.5	18.1		69.1	5.7	-	9.7	15.5	30.9
	Rural	1972	1.3	0.0	3.5		4.8	13.6	-	79.6	2.0	95.2
Trinidad and Tobago	Total	1970	31.6	13.4	41.4		86.3	-	-	-	-	13.6
	Urban											
	Rural											
Uruguay	Total	1975	-	-	-	-	72.8	17.0	8.1	-	2.1	27.2
	Urban	1975	-	-	-	-	73.2	17.3	7.1	-	2.4	26.8
	Rural	1975	-	-	-	-	3.6	58.4	32.3	-	5.8	96.4
Venezuela	Total	1971	72.4	-	6.2	-	78.6	-	5.5	7.6	8.3	21.4
	Urban		-	-	-	-	-	-	-	-	-	-
	Rural		-	-	-	-	-	-	-	-	-	-

Source: Most recent housing census of each country.

Table 2

SANITARY FACILITIES, BY TYPE

(Percentages)

Country		Year	Water closet			Latrine	None or unknown
			Sewerage	Septic tank	Subtotal		
Argentina	Total	1960			61.5	25.2	13.3
	Urban	1960			73.8	19.3	6.9
	Rural	1960			21.1	44.7	34.2
Bolivia	Total	1976	12.7	1.7	14.5	6.8	78.7
	Urban	1976	30.7	3.6	34.4	12.2	53.4
	Rural	1976	0.4	0.4	0.8	3.1	96.1
Brazil	Total	1970	17.5	9.5	26.9	33.3	39.7
	Urban	1970	29.8	15.2	45.1	40.9	14.0
	Rural	1970	0.5	1.6	2.1	22.8	75.1
Colombia	Total	1973	51.4	6.2	57.6	10.5	31.9
	Urban	1973	75.7	6.5	82.2	9.4	8.4
	Rural	1973	6.8	5.6	12.3	12.7	75.0
Costa Rica	Total	1973	14.8	29.4	44.3	44.7	11.1
	Urban		...	...	...	...	...
	Rural		...	...	...	...	...
Cuba	Total	1970			43.8	38.2	18.0
	Urban	1970			64.1	29.0	6.9
	Rural	1970			6.0	55.1	38.8
Chile	Total	1970	45.7	5.9	51.5	45.7	2.7
	Urban	1970	58.3	6.2	64.5	35.2	0.3
	Rural	1970	3.3	4.8	8.1	81.2	10.7
Ecuador	Total	1974	28.1		28.1	9.9	62.0
	Urban	1974	64.4		64.4	15.8	19.8
	Rural	1974	3.2		3.2	5.9	90.9
El Salvador	Total	1971	16.1	6.3	22.4	18.8	58.8
	Urban	1971	39.0	12.8	51.8	30.5	17.8
	Rural	1971	0.0	1.7	1.7	10.6	87.8
Guatemala	Total	1973	14.9	3.0	17.9	22.8	59.2
	Urban	1973	39.5	6.0	45.5	36.9	17.6
	Rural	1973	0.6	1.3	1.8	14.6	83.6
Honduras	Total	1974	13.0	1.3	14.4	17.8	67.8
	Urban	1974	38.6	3.3	41.9	36.9	21.2
	Rural	1974	1.2	0.4	1.6	9.0	89.4
Jamaica	Total	1970			31.3	65.4	3.3
	Urban	1970			63.0	36.2	0.8
	Rural	1970			5.5	89.2	5.3
Mexico	Total	1970			41.5	—— 58.5 ——	
	Urban	1970			61.0	—— 39.0 ——	
	Rural	1970			13.8	—— 86.2 ——	
Nicaragua	Total	1971	15.3	4.0	19.3	34.0	46.7
	Urban	1971	31.0	6.9	37.9	52.7	9.4
	Rural	1971	0.2	1.1	1.3	16.1	82.6
Panama	Total	1970	31.7	8.4	40.1	31.6	28.3
	Urban	1970	62.2	11.7	74.0	23.1	2.9
	Rural	1970	1.5	5.2	6.6	40.1	53.3
Paraguay	Total	1972	4.3	10.0	14.3	79.4	6.2
	Urban	1972	10.8	22.8	33.6	63.9	2.5
	Rural	1972	0.0	1.3	1.3	89.9	8.8
Peru	Total	1972	22.1	0.1	22.2	4.8	73.0
	Urban	1972	38.4	0.2	38.6	7.7	53.7
	Rural	1972	0.5	0.0	0.5	0.8	98.6
Trinidad and Tobago	Total	1970	12.2	15.5	27.7	71.7	0.6
	Urban						
	Rural						
Uruguay	Total	1975	43.8		43.8	48.3a/	7.9
	Urban	1975	25.4		25.4	67.4a/	7.3
	Rural	1975	0.9		0.9	74.7a/	24.5
Venezuela	Total	1971	40.3	13.2	53.5	23.9	22.6
	Urban						
	Rural						

Source: Most recent housing census of each country.

a/ Includes septic tanks.

/establish in

establish in an exact manner the present coverage of water supply and
sanitation services even at the country level. Information on the type of
services provided is increasingly less available as greater detail is demanded.

For the purpose of this study, it was necessary to develop a
standardized estimate of existing coverage and the decision was taken to
attempt to develop best estimates of the likely provision of service in 1977,
on the basis of all available information including the most recent information
provided by the Pan-American Health Organization (see table 3).1/ The most
problematical of all the estimates is that of the provision of sanitary excreta
disposal in rural areas. The difficulty lies in the definition of what
sanitary excreta disposal consists of, in the absence of the simple and clear-
cut solution of a sewerage connexion. A stricter or looser definition may
largely explain the very big variations seen in the existing provision of
sanitary excreta disposal between countries of generally similar economic and
social development.

Future demand for water supply and sanitation and levels of investment in Latin America and the Caribbean

The level of future demand for water supply and sanitation, in any period,
is set in an absolute sense by the difference between the present population
having an adequate water supply and sanitation facilities and the existing
total population plus with the expected increase in population over the period.
This absolute demand may not materialize into effective demand due to the lack
of the ability to pay for the improved service either individually or by the
community.

In order to reflect this possibility two estimates of future demand for
water supply and sanitation in Latin America have been developed as the basis
for the preparation of estimates of the probable future demand for finance.
The two estimates are based on the following:

1/   For some countries, particularly in the Caribbean, little information
      is available and they have had to be excluded from the table. Fortunately,
      in the majority of Caribbean countries access to water supply and
      adequate sanitation is universal and the task in the next Decade is to
      maintain, improve and expand existing facilities rather than to meet
      a heavy backlog of demand.

Table 3

LATIN AMERICA: ESTIMATED PROVISION OF WATER SUPPLY AND EXCRETA DISPOSAL, LATE 1970s

(Percentage of population)

Country	Water supply		Sewerage		Other excreta disposal devices
	Urban	Rural	Urban	Rural	Rural
Argentina a/	70	14	33	-	66
Bolivia b/	30	2	31	0	4
Brazil c/	66	10	65	9	31
Colombia b/	80	29	76	7	81
Costa Rica d/	95	60	42	4	79
Cuba d/e/	91	10	46	6	-
Chile b/	81	8	50	9	81
Dominican Republic d/	66	12	27	-	40
Ecuador b/	73	6	65	3	7
El Salvador d/	54	3	34	-	21
Guatemala b/	58	6	40	-	17
Haiti d/	17	0	0	0	5
Honduras b/	75	13	43	1	10
Jamaica b/	77	12	33	0	95
Mexico d/	70	32	41	0	35
Nicaragua d/	65	9	38	0	18
Panama b/	92	12	74	6	41
Paraguay b/	27	0	38	0	92
Peru b/	55	3	42	1	1
Uruguay b/	75	24	54	21	55
Venezuela b/	65	31	65	15	73

Source: This table is based upon various sources including censuses and PAHO Surveys. The most significant source is indicated for each country and entry.

Note: Water supply is taken to be a connection to a centralized piped system either in the house or lot. Sewerage is connection to a sewerage system or a septic tank. Other excreta disposal devices are mainly latrines.

a/ Argentina, Secretaría de Estado de Transporte y Obras Públicas, Subsecretaría de Recursos Hídricos, Instituto Nacional de Ciencia y Técnica Hídricas, La demanda de agua en la República Argentina, Mendoza, 1976.
b/ Most recent census of population or housing.
c/ IBRD, Brazil, Human Resources Special Report.
d/ Pan America Health Organization, Health Conditions in the Americas, 1977.
e/ In the case of Cuba, the government has adopted a policy of concentration of the rural population and the provision of sewerage. In consequence, the use of other sanitary devices is not relevant to future policies and no estimate of the population currently so served has been made.

/1. On

1. On the stated or assumed goals of individual countries for the
International Drinking Water Supply and Sanitation Decade, as an estimate
of effective demand. Where the goals have had to be assumed, they have
been based on inter-country similarities or on other information available
on investment policies (see table 4).

2. On the assumption that the whole future population will be supplied
with adequate water supply and sanitation by 1990.2/

The resulting estimates show, not surprisingly, that large increments
in demand for both water supply and sanitation can be expected under both
sets of assumptions (see tables 5 and 6). In many countries, these
estimated increases in demand exceed the present provision of service,
particularly in the supply of sanitary excreta disposal facilities in both
urban and rural areas. In some countries the increase in new installations
required to achieve the goals established for the Decade will triple or
quadruple existing installations. It is obvious that such tremendous
changes in the installation of adequate facilities will generate very heavy
investment demand for the sector, which will be increased further if
complete coverage of the population is adopted as the goal.

Future investment requirements

The expected investment required during the decade has been estimated
by applying two estimates of installation costs of new connexions using
conventional technology to the two estimates of the future population to
be served to obtain four different projections of future investment
requirements.3/ The estimates of the costs of installation were obtained

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2/ The definition of an adequate water supply is a household connexion to
a central water supply system for the urban and concentrated rural
population and, at least, a protected source of water for the dispersed
rural population. Adequate sanitation is defined as a household
connexion to a centralized sewerage system or septic tank for the urban
and concentrated rural population, and, at least, a sanitary latrine
for the dispersed rural population.

3/ Conventional technology is piped water and sewerage or septic tanks in
urban areas and piped water or wells and sewerage, septic tanks or
latrines in rural areas.

Table 4

COUNTRY GOALS FOR WATER SUPPLY AND EXCRETA DISPOSAL AT
THE END OF INTERNATIONAL DRINKING WATER SUPPLY
AND SANITATION DECADE

(Percentage of the total population)

| Country | Drinking water supply | | Sanitation | |
	Urban	Rural	Urban	Rural
Argentina	80	40	70	100
Bolivia	100	40	70	35
Brazil	83	32	75	54
Chile	100	80	80	100
Colombia	90	75	80	100
Costa Rica	100	90	100	100
Cuba	100	40	90	35
Dominican Republic	80	40	70	60
Ecuador	100	100	100	100
El Salvador	100	36	90	40
Guatemala	75	20	0	80
Haiti	47	8	30	35
Honduras	80	21	65	75
Jamaica	90	40	100	100
Mexico	80	60	70	100
Nicaragua	80	50	50	35
Panama	100	40	90	60
Paraguay	70	40	60	100
Peru	80	40	70	35
Uruguay	100	100	100	100
Venezuela	80	75	70	100

Source: Data supplied by governments.

Table 5

FUTURE DEMAND FOR WATER SUPPLY AND EXCRETA DISPOSAL BASED ON COUNTRY GOALS FOR 1990

| Countries | Drinking water supply | | | | | | Excreta disposal | | | | | |
| | Urban | | | Rural | | | Urban | | | Rural | | |
	Population served in 1977	Population to be served in 1990 a/	Increment in population served	Population served in 1977	Population to be served in 1990 a/	Increment in population served	Population served in 1977	Population to be served in 1990 a/	Increment in population served	Population served in 1977	Population to be served in 1990 a/	Increment in population served
Argentina	14 849.8	20 876.3	6 026.5	675.5	1 672.5	997.0	7 000.6	18 266.7	11 266.1	3 184.5	4 181.2	996.7
Bolivia	596.2	3 345.2	2 749.0	63.3	1 587.3	1 524.1	616.1	2 341.7	1 725.6	126.5	1 388.9	1 262.4
Brazil	46 359.7	91 204.5	44 844.9	4 361.7	13 851.6	9 489.9	45 657.2	82 413.7	36 756.5	17 446.8	23 374.5	5 927.7
Colombia	13 044.8	23 073.7	10 028.9	2 522.1	6 495.1	3 973.0	12 392.5	20 510.0	8 117.4	7 653.4	8 660.1	1 006.7
Costa Rica	856.4	1 460.7	604.3	696.3	1 183.3	487.0	378.6	1 460.7	1 082.1	963.2	1 314.8	351.5
Cuba	5 508.8	7 655.5	2 146.7	354.0	1 339.4	985.4	2 784.7	6 889.9	4 105.3	212.4	1 172.0	959.6
Chile	6 787.2	11 202.2	4 415.0	173.7	1 486.8	1 313.2	4 189.6	8 961.7	4 772.1	1 953.7	1 858.5	0.0
Dominican Republic	1 630.0	3 327.6	1 697.6	365.0	1 349.8	984.8	666.8	2 911.7	2 244.8	1 216.5	2 024.7	808.2
Ecuador	2 290.4	5 383.6	3 093.2	250.8	5 565.3	5 314.5	1 976.6	5 383.6	3 406.9	418.0	5 565.3	5 147.3
El Salvador	1 018.0	3 207.2	2 189.2	75.2	1 179.8	1 104.6	640.9	2 886.5	2 245.5	526.7	1 310.9	784.2
Guatemala	1 423.5	3 151.1	1 727.6	250.8	1 095.0	844.1	981.7	3 361.2	2 379.5	710.7	4 379.9	3 669.2
Haiti	214.5	1 093.7	879.1	0.0	388.6	388.6	0.0	698.1	698.1	207.2	1 813.6	1 606.5
Honduras	947.1	1 950.2	1 003.2	267.2	560.2	293.0	543.0	1 584.6	1 041.6	226.1	2 000.6	1 774.6
Jamaica	722.8	1 175.3	452.5	137.7	463.2	325.6	309.8	1 305.9	996.1	1 089.9	1 158.1	68.1
Mexico	28 416.7	57 059.7	-28 642.9	7 257.2	15 756.0	8 498.8	16 644.1	49 927.2	33 283.1	7 937.5	26 260.0	18 322.5
Nicaragua	838.8	1 858.4	1 019.6	106.7	727.7	621.0	490.4	1 161.5	671.1	213.4	509.4	296.0
Panama	850.9	1 431.1	580.1	100.8	366.0	265.2	684.4	1 288.0	603.5	394.8	549.0	154.1
Paraguay	302.7	1 312.4	1 009.7	0.0	842.6	842.6	426.0	1 124.9	689.9	1 507.9	2 106.5	598.6
Peru	5 655.7	13 473.1	7 817.5	178.9	2 605.5	2 426.6	4 318.9	11 789.0	7 470.1	119.3	2 279.8	2 160.5
Uruguay	1 800.1	2 785.7	985.6	112.5	380.2	267.7	1 296.1	2 785.7	1 489.6	356.3	380.2	23.9
Venezuela	6 767.0	13 618.2	6 851.1	968.8	2 390.3	1 421.5	6 767.0	11 915.9	5 148.9	2 750.2	3 187.1	436.9
Total	140 881.1	269 645.4	128 764.2	18 918.2	61 286.2	42 368.2	108 765.0	238 968.2	130 193.8	49 215.0	95 475.1	46 355.2

a/ Population estimates taken from CELADE, Boletín Demográfico, Año XII, Nº 23, January 1979; and Boletín Demográfico, Año XIII, Nº 25, January 1980.

Table 6

FUTURE DEMAND, ASSUMING 100 PER CENT COVERAGE IN 1990: INCREMENT IN POPULATION SERVED[a]/

(Thousands)

Country	Drinking water supply		Excreta disposal	
	Urban	Rural	Urban	Rural
Argentina	11 245.5	3 505.7	19 094.7	996.7
Bolivia	2 749.0	3 905.1	2 729.2	3 841.8
Brazil	63 525.3	38 924.4	64 227.7	25 839.3
Colombia	12 592.7	6 138.0	13 244.9	1 006.7
Costa Rica	604.3	618.5	1 082.1	351.5
Cuba	2 146.7	2 994.5	4 870.8	3 136.1
Chile	4 415.0	1 684.9	7 012.5	0.0
Dominican Republic	2 529.5	3 009.5	3 492.7	2 158.0
Ecuador	3 093.2	5 314.5	3 406.9	5 147.3
El Salvador	2 189.2	3 202.0	2 566.2	2 750.6
Guatemala	2 778.0	5 224.1	3 219.8	4 764.2
Haiti	2 112.4	5 181.8	2 326.9	4 974.6
Honduras	1 490.7	2 400.3	1 894.8	2 441.4
Jamaica	583.1	1 020.4	996.1	68.1
Mexico	42 907.9	19 002.8	54 680.5	18 322.5
Nicaragua	1 484.2	1 348.8	1 832.6	1 242.1
Panama	580.1	814.1	746.6	520.1
Paraguay	1 572.1	2 106.5	1 448.8	598.6
Peru	11 185.8	6 334.8	12 522.6	6 394.5
Uruguay	985.6	267.7	1 489.6	23.9
Venezuela	10 255.7	2 218.3	10 255.7	436.9
Total	181 026.0	115 216.7	213 141.7	85 014.9

a/ Future population estimates based on same source as in table 5.

/from the

from the Pan-American Health Organization (PAHO) and the International Bank
for Reconstruction and Development (IBRD). In the former case the cost
information is country-specific, but in the latter one set of cost estimates
has been applied to the whole region.

Over the period 1977-1990, the expected investment resulting from this
method of estimation is relatively high for the region as a whole. The total
investment required in the region over the Decade varies from a minimum of
US$ 36 billion, with less than complete coverage and assuming lower connexion
costs of PAHO, to a maximum of US$ 61 billion, with complete coverage of the
population with adequate services and assuming the higher connexion cost
estimates taken from the IBRD. The annual investment estimated for the
Decade would range from US$ 2.76 to 4.69 billion, compared with an estimated
average annual investment of some US$ 2 billion during the period 1970-1977.
Such regional estimates mask, however, significant national differences which
will have considerable impact on the real possibilities of achieving the
goals established.

The increase in investment required to achieve the goals established
for the Decade varies considerably from country to country. A large
proportion of the total investment required is concentrated in a few of the
larger and more developed countries of the region: Argentina, Brazil, Mexico
and Venezuela (see tables 7, 8, 9 and 10). Relatively speaking, however,
the weight of the estimated levels of investment necessary to meet the goals
of the Decade falls more heavily, however, on the smaller countries with less
developed economies, particularly, Bolivia, El Salvador, Haiti and Honduras.
In the region as a whole the increase in investment required to meet the
Decade's aims will vary from 50% to over 150% above the average annual
investment in the seventies (see table 11). In a few countries, such as
Brazil, even to achieve complete coverage of the population, all that is
required is that services should continue to expand at the rate achieved
during the 1970s. In a large group of countries an expansion of some 50 to
75% in the historical rates of increase in service will be required. In
a few, generally the least developed, a very large expansion will be demanded
even to supply between half and three-quarters of the population with adequate
services, as in the case of Bolivia, Ecuador, El Salvador, Haiti and Paraguay.

/Table 7

Table 7

INVESTMENTS 1977-1990 BASED ON GOALS AND PAHO COST ESTIMATES

(Millions of dollars at 1978 prices)

| Country | Drinking water supply | | | | Excreta disposal | | | | Total investment |
| | Urban | | Rural | | Urban | | Rural | | |
	Dollars	Percentage	Dollars	Percentage	Dollars	Percentage	Dollars	Percentage	Dollars
Argentina	723.5	29.6	119.7	4.9	1 578.4	64.7	20.0	0.8	2 441.6
Bolivia	165.2	42.3	91.6	23.5	120.7	30.9	12.7	3.3	390.2
Brazil	5 828.9	40.7	949.0	6.6	7 351.3	51.4	178.1	1.3	14 307.4
Colombia	1 002.9	43.5	397.3	17.2	893.0	38.7	15.0	0.7	2 308.3
Costa Rica	48.4	32.5	38.9	26.2	97.4	39.0	3.5	2.4	188.3
Cuba	257.4	23.7	118.3	10.9	574.9	53.0	134.4	12.4	1 085.0
Chile	352.8	43.6	170.8	21.1	286.5	35.4	0.0	0.0	810.1
Dominican Republic	169.8	32.2	98.5	18.7	246.9	46.8	12.1	2.3	527.2
Ecuador	247.5	25.3	425.0	43.4	255.4	26.0	51.6	55.3	979.4
El Salvador	218.9	41.0	88.4	16.6	224.6	42.1	1.6	0.3	533.4
Guatemala	155.3	41.3	63.4	16.8	143.0	38.0	14.7	3.9	376.4
Haiti	35.2	24.6	15.6	10.9	28.0	19.6	64.3	45.0	143.1
Honduras	100.3	39.4	14.7	5.8	104.2	40.9	35.6	14.0	254.8
Jamaica	45.3	26.3	26.0	15.1	99.6	58.0	1.0	0.6	171.9
Mexico	2 293.4	34.9	680.5	10.4	3 328.3	50.6	273.9	74.2	6 576.1
Nicaragua	81.6	39.2	49.6	23.9	73.9	35.5	2.9	1.4	208.1
Panama	75.4	29.9	18.6	7.4	157.0	62.2	1.5	0.6	252.5
Paraguay	101.0	45.5	25.3	11.4	83.9	37.8	11.9	5.4	222.1
Peru	626.0	47.7	121.3	9.2	522.3	39.8	43.2	3.3	1 312.9
Uruguay	137.9	70.2	13.4	6.8	44.5	22.7	0.7	0.4	196.6
Venezuela	1 028.3	50.8	213.3	10.6	772.8	38.2	8.7	0.4	2 023.1
Total	13 695.0	38.8	3 739.2	10.6	16 986.6	48.1	887.4	2.5	35 308.5

Note: Due to rounding the figures do not necessarily sum to the total.

Table 8

REQUIRED INVESTMENT ASSUMING 100 PER CENT COVERAGE AND USING PAHO COST ESTIMATES

Country	Potable water supply				Excreta disposal				Total investment
	Urban		Rural		Urban		Rural		
	Dollars	Percentage	Dollars	Percentage	Dollars	Percentage	Dollars	Percentage	Dollars
Argentina	1 250.1	30.2	420.9	9.4	2 675.3	59.9	20.0	0.5	4 466.2
Bolivia	165.2	26.2	234.7	37.3	190.9	30.3	38.8	6.2	629.5
Brazil	8 257.0	32.0	3 892.4	15.1	12 845.5	49.8	776.6	3.0	25 771.6
Colombia	1 259.3	37.6	613.8	18.3	1 457.1	43.6	15.0	0.5	3 345.2
Costa Rica	48.4	24.3	49.5	24.9	97.4	49.0	3.5	1.8	198.8
Cuba	257.4	14.8	359.5	20.7	682.2	39.2	439.3	25.3	1 738.3
Chile	352.8	35.5	219.1	22.1	421.0	42.4	0.0	0.0	993.0
Dominican Republic	253.0	26.1	301.0	31.0	384.1	39.6	32.3	3.3	970.3
Ecuador	247.5	25.3	425.0	43.4	255.4	26.1	51.6	5.3	979.4
El Salvador	218.9	29.7	256.2	34.8	256.6	34.8	5.5	0.7	737.2
Guatemala	249.8	29.2	392.3	45.9	193.5	22.6	19.1	2.2	·854.6
Haiti	84.7	14.5	207.5	35.5	93.3	15.9	199.2	34.1	584.6
Honduras	149.1	29.4	120.2	23.7	189.5	37.3	49.0	9.6	507.8
Jamaica	58.3	24.2	81.6	33.9	99.6	41.4	1.0	0.4	240.5
Mexico	3 435.6	32.1	1 521.5	14.2	5 468.0	51.1	273.9	2.6	10 699.1
Nicaragua	118.8	27.0	107.8	24.5	201.7	45.8	12.4	2.8	440.7
Panama	75.4	22.7	57.1	17.2	194.2	58.5	5.2	1.6	331.9
Paraguay	157.2	38.7	63.2	15.6	173.9	42.8	11.9	2.9	406.2
Peru	895.7	40.4	316.7	14.3	875.6	39.5	127.9	5.8	2 216.0
Uruguay	137.9	70.2	13.4	6.8	44.5	22.6	0.7	0.4	196.6
Venezuela	1 539.2	45.0	332.9	9.7	1 539.2	45.0	8.7	0.3	3 420.2
Total	19 311.3	32.3	9 986.3	16.7	28 338.5	47.4	2 091.6	3.5	59 727.7

Note: Due to rounding the figures do not necessarily sum to the total.

Table 9

INVESTMENT IN 1977-1990 BASED ON GOALS AND WORLD BANK COST ESTIMATES

(Millions of dollars at 1978 prices)

Country	Drinking water supply				Excreta disposal				Total investment
	Urban		Rural		Urban		Rural		
	Dollars	Percentage	Dollars	Percentage	Dollars	Percentage	Dollars	Percentage	Dollars
Argentina	795.0	25.8	269.6	8.8	1 932.2	62.7	84.7	2.8	3 081.5
Bolivia	308.2	28.1	465.4	42.4	251.5	22.9	71.9	6.6	1 097.0
Brazil	4 422.6	43.8	848.8	8.4	4 712.4	46.7	117.7	1.2	10 101.5
Colombia	738.5	29.8	909.2	36.7	777.1	31.4	51.3	2.1	2 476.1
Costa Rica	57.9	20.2	81.3	28.3	134.7	47.0	13.0	4.5	286.9
Cuba	260.5	23.1	96.8	8.6	647.7	57.4	122.5	10.9	1 127.5
Chile	452.4	33.8	251.1	18.8	635.6	47.5	0.0	0.0	1 339.1
Dominican Republic	162.9	29.6	91.0	16.5	280.1	50.8	17.2	3.1	551.2
Ecuador	278.7	13.5	1 165.4	56.3	399.0	19.3	225.7	10.9	2 068.8
El Salvador	215.5	35.0	99.5	16.1	287.3	46.6	14.1	2.3	616.4
Guatemala	181.5	27.9	76.7	11.8	324.9	50.0	66.7	10.3	649.9
Haiti	90.8	30.3	43.0	14.3	93.8	31.3	72.1	24.1	299.7
Honduras	90.4	33.6	25.6	9.5	122.0	45.4	31.0	11.5	268.9
Jamaica	56.9	22.0	35.5	13.7	162.7	63.0	3.2	1.3	258.2
Mexico	2 460.7	31.4	912.7	11.7	3 717.2	47.5	739.8	9.5	7 830.4
Nicaragua	85.4	40.1	49.8	23.4	73.1	34.3	4.8	2.2	213.1
Panama	62.2	35.6	25.6	14.6	84.2	48.1	3.0	1.7	175.0
Paraguay	99.2	27.3	141.2	38.9	89.2	24.6	33.4	9.2	363.0
Peru	763.4	37.9	258.1	12.8	948.4	47.0	46.0	2.3	2 015.9
Uruguay	137.6	30.9	35.9	8.1	270.5	60.7	1.4	0.3	445.4
Venezuela	597.8	45.4	123.6	9.4	584.1	44.4	10.3	0.8	1 315.9
Total	12 318.1	33.7	6 005.8	16.4	16 527.7	45.2	1 729.8	4.7	36 581.4

Note: Due to rounding the figures do not necessarily sum to the total.

Table 10

INVESTMENT ASSUMING 100 PER CENT OF COVERAGE IN 1990 AND USING WORLD BANK COST ESTIMATES

(Millions of dollars at 1978 prices)

Country	Drinking water supply				Excreta disposal				Total investment
	Urban		Rural		Urban		Rural		
	Dollars	Per- cent- age	Dollars	Per- cent- age	Dollars	Per- cent- age	Dollars	Per- cent- age	Dollars
Argentina	1 483.6	25.6	948.1	16.4	3 274.8	56.6	84.7	1.5	5 791.2
Bolivia	308.2	14.6	1 192.5	56.3	397.7	18.8	218.8	10.3	2 117.3
Brazil	6 264.8	33.9	3 481.6	18.8	8 234.3	44.5	513.1	2.8	18 493.8
Colombia	927.3	25.4	1 404.7	38.5	1 267.9	34.7	51.3	1.4	3 651.2
Costa Rica	57.9	18.8	103.2	33.4	134.7	43.6	13.0	4.2	308.8
Cuba	260.5	15.1	294.2	17.1	768.5	44.6	400.5	23.2	1 723.6
Chile	452.4	26.5	322.2	18.9	934.0	54.7	0.0	0.0	1 708.6
Dominican Republic	242.8	24.2	278.1	27.7	435.7	43.5	45.9	4.6	1 002.5
Ecuador	278.7	13.5	1 165.4	56.3	399.0	19.3	225.7	10.9	2 068.8
El Salvador	215.5	24.4	288.5	32.7	328.4	37.2	49.6	5.6	881.9
Guatemala	291.8	22.6	474.9	36.7	439.7	34.0	86.6	6.7	1 293.0
Haiti	218.2	16.4	573.2	43.2	312.5	23.5	223.4	16.8	1 327.3
Honduras	134.3	22.1	209.5	34.4	221.9	36.5	42.6	7.0	608.3
Jamaica	73.3	20.9	111.2	31.7	162.7	46.4	3.2	0.9	350.3
Mexico	3 686.2	29.3	2 040.7	16.2	6 106.9	48.6	739.8	5.9	12 573.7
Nicaragua	124.3	27.5	108.2	24.0	199.5	44.1	19.9	4.4	452.0
Panama	62.2	24.4	78.6	30.8	104.1	40.8	10.0	3.9	255.0
Paraguay	154.4	21.3	352.9	48.6	185.0	25.5	33.4	4.6	725.8
Peru	1 092.4	31.3	673.9	19.3	1 589.8	45.5	136.1	3.9	3 492.1
Uruguay	137.6	30.9	35.9	8.1	270.5	60.7	1.4	0.3	445.4
Venezuela	894.9	39.6	192.9	8.5	1 163.4	51.4	10.3	0.5	2 261.5
Total	17 361.3	28.2	14 330.4	23.3	26 931.0	43.8	2 909.3	4.7	61 532.1

Note: Due to rounding the figures do not necessarily sum to the total.

/Table 11

Table 11

LATIN AMERICA: ESTIMATED ANNUAL INVESTMENT IN WATER SUPPLY AND
EXCRETA DISPOSAL, 1970-1977 AND 1977-1990

(Thousands of dollars at 1978 prices)

Country	Water supply		Excreta disposal		Annual average 1977-1990 as proportion of annual average 1970 - 1977	
	1970	1977	1977	1990		
Argentina	77 983	85 813	187 815	445 477	219	241
Bolivia	4 133	9 553	30 015	162 869	726	1 705
Brazil	.760 101	1 105 612	777 038	1 100 569	100	102
Colombia	107 689	149 116	218 977	280 861	147	188
Costa Rica	7 753	9 471	11 446	23 754	148	251
Cuba	53 820	54 242	83 461	132 585	155	244
Chile	44 565	68 838	72 662	131 431	163	191
Dominican Republic	23 681	23 918	40 554	77 115	172	322
Ecuador	20 802	29 660	75 338	159 138	362	537
El Salvador	6 229	6 970	41 031	67 838	659	973
Guatemala	14 683	20 213	27 600	92 461	188	492
Haiti	530	1 365	15 846	102 100	2 760	7 480
Honduras	10 675	11 019	20 838	46 792	195	425
Jamaica	6 305	9 163	13 223	26 946	210	294
Mexico	181 633	205 460	505 854	967 208	278	471
Nicaragua	10 986	11 132	19 046	34 769	174	312
Panama	9 113	14 126	12 869	19 615	132	139
Paraguay	7 612	7 910	17 085	55 831	224	706
Peru	58 149	84 811	100 992	268 623	174	317
Uruguay	5 733	9 866	14 238	34 262	248	347
Venezuela	78 151	111 539	101 215	173 962	130	156
Total	1 904 458	1 915 755	2 771 623	4 719 385	145	246

Note: The range is provided by application of OPS and IBRD cost estimates for new connections.

/In these

In these cases, with the possible exception of Ecuador, significant expansion
in the supply of water and excreta disposal services is unlikely to be
achieved without external assistance and in some cases the magnitudes of the
change required are so great as to provide a considerable administrative as
well as financial challenge. There is, in addition, a small group of more
highly developed countries, Argentina, Mexico and Uruguay, where at a minimum
recent historical rates of investment will have to double at least. These
three countries are, however, in a quite different situation in respect of the
impact of this increased investment in the sector on their economies, and in
their ability to cope with the repercussions of the expansion on the demand for
administrative adjustment and trained staff.

The financing of investment in water supply
and excreta disposal

Possible future levels of investment in water supply and excreta
disposal have been estimated, for the purposes of this study, on the basis
of the relationship between gross national product, or national income, and
the level of the provision of water supply and sanitation to the urban and
rural population. This is a very general and crude explanation of the
provision of service so that the investment requirements estimated and
presented in this report are no more than indicative of the possible future
financial demands of the sector.

On the basis of a relatively simple regression of the historical levels
of provision of adequate water supply and sanitation service against per
capita gross national product, the level of service provision to be expected
at the end of the Decade was estimated separately for urban water supply,
urban sanitation, rural water supply and rural sanitation on the basis of two
different assumptions regarding future growth taken from a recent study of
CEPAL.[4] The CEPAL study divides the countries of Latin America into three
groups - large, medium and small countries - and for each group of countries

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[4]   CEPAL, "Long-term trends and prospects of the development of Latin
       America", E/CEPAL/1076, 12 April 1979.

provides two estimates of the future growth of national income.5/ For
countries of each group two estimates of the level of the provision of
services at the end of the Decade were therefore generated (see table 12).
From the comparison of these estimates with the goals established for the
Decade various observations can be made. It must be borne in mind, however,
that the actual figures produced in these estimates provide only a rough
guide to what may be the actual situation.

First, the effect of the higher growth rates is limited, rarely
increasing the proportion of the population served by more than 5% in any
category over the Decade. A second and perhaps more important observation
is that if past trends continue in the sector as reflected by the formula
applied here, most countries will achieve the goals they have established
for urban drinking water supply, although falling short of complete coverage
of the whole urban population. In contrast, in the provision of urban
sewerage and rural water supply, the continuing of historical trends will
permit few countries to achieve the goals established for the Decade, and
none will achieve complete coverage. A rather anomalous result is shown for
rural sanitation. Nearly all countries of the region will realize the goals
established and a good number will be providing adequate excreta disposal for
the whole rural population. This result is perhaps in part a reflection of
the rather optimistic view taken here of the current state of rural excreta
disposal, but partly also reflects the low capital cost of achieving
substantial improvements in coverage.

5/   LATIN AMERICA: ANNUAL GROWTH RATE OF INCOME, 1980-1990

	Maintenance of historical tendency	Moderate acceleration
Large countries a/	6.6	7.6
Middle-size countries b/	5.4	6.6
Small countries c/	5.5	6.8

a/   Argentina, Brazil and Mexico.

b/   Colombia, Chile, Peru and Venezuela.

c/   Bolivia, Costa Rica, Ecuador, El Salvador, Dominican Republic,
Guatemala, Haiti, Honduras, Nicaragua, Panama, Paraguay and Uruguay.

Source: E/CEPAL/1076.

Table 12

LATIN AMERICA: GOALS ANNOUNCED FOR THE DECADE AND ESTIMATED
PROVISION BASED ON EXPECTED GROWTH IN INCOME, 1990

Country	Water supply						Excreta disposal					
	Urban			Rural			Urban			Rural a/		
	Decade goal	Estimated coverage		Decade goal	Estimated coverage		Decade goal	Estimated coverage		Decade goal	Estimated coverage	
		Low	High		Low	High		Low	High		Low	High
Argentina	80	84	86	40	23	24	70	45	47	100	90	93
Bolivia	100	38	41	40	7	9	70	38	40	35	18	23
Brazil	83	79	81	32	18	19	75	76	78	54	62	65
Colombia	90	90	93	75	35	37	80	85	87	100	100	100
Costa Rica	100	100	100	90	66	68	100	51	53	100	100	100
Chile	100	93	96	80	16	17	80	61	63	100	100	100
Dominican Republic	80	75	78	40	18	20	70	35	38	60	56	61
Ecuador	100	81	84	100	11	13	100	70	72	100	24	28
El Salvador	100	62	65	36	8	10	90	41	43	40	34	39
Guatemala	75	66	69	20	11	13	80	47	50	80	31	36
Haiti	47	26	29	7.5	6	8	30	8	11	35	21	26
Honduras	80	83	86	21	18	20	65	50	52	75	24	29
Mexico	80	80	82	60	38	40	70	50	51	100	52	55
Nicaragua	80	70	72	50	12	14	50	42	44	35	26	31
Panama	100	100	100	40	18	20	90	83	85	60	64	69
Paraguay	70	36	39	40	6	7	60	46	48	100	100	100
Peru	80	62	64	40	7	9	70	48	50	35	14	18
Uruguay	100	89	92	100	33	34	100	66	69	100	100	100
Venezuela	80	73	75	75	36	37	70	72	74	100	100	100

a/ Sanitary latrines.

/It is

It is clear, therefore, that continued investment in the sector at historical rates, which this analysis reflects, will not result in the achievement of the goals or change the existing disparities between countries by the end of the Decade. The more ambitious goals of complete coverage of the urban population with house connexions to water supply and sewerage system and of adequate safe rural water supply and excreta disposal certainly cannot be met without a significant change in the relationship between service provision and gross national product. This change will require a willingness to dedicate a greater share of resources to the sector than in the past.

To achieve the goals of the Decade, this analysis shows a need for higher levels of investment than in the past and, consequently, greater finance. In the past, the financing of investments in water supply and sanitation have come from four main sources, external borrowing or aid, general taxation, income of water supply and sanitation agencies and the users' own resources. The importance of each of these sources has varied according to the time, place and technology employed. In the future, investment in the sector will probably continue to flow from these four main sources and their importance will continue to vary according to the specific policies adopted in this area.6/

In estimating the future contributions to be expected from these different sources, the following must be taken into account.

(i) User contributions to the financing of investments during the Decade are likely to be heavily concentrated amongst those groups most deprived of adequate service, the rural dispersed population. In more densely populated areas, both rural and urban, which are suitable for centralized piped systems, any direct user contribution will most likely be restricted to the payment of connexion charges.

(ii) The contribution to the financing of water supply and sewerage systems derived from the income of water supply and sewerage companies depends on the tariffs charged. In the past, the proportion of financial

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6/ Foreign aid or grants are likely to remain of little absolute significance.

/resources for

resources for the extension of systems which has been generated from tariffs
has been both small and variable. The variability of tariff income with
inflation is shown by the summary account of income and expenditure of the
National Sanitary Institute in Argentina for the period 1975-1977
(see table 13). It is, however, a potentially significant source as can be
seen from the example of the estimated generation of funds for the three
major water supply and sanitation agencies in Chile (see table 14).

Table 13

SUMMARY ACCOUNTS OF AN ARGENTINIAN SANITATION AGENCY

(Obras Sanitarias de la Nación)

	(Millions of US dollars at current prices)		
	1975	1976	1977
Source of income			
Tariffs	71.6	45.7	131.8
Subsidies	43.4	101.0	46.0
Other	12.4	8.6	35.6
Domestic loans	102.6	8.3	47.0
Total income	230.0	163.6	260.1
Expenditures			
Capital investment	70.2	80.1	132.0
Operation and maintenance	118.9	66.9	90.4
Debt service	8.9	7.6	4.9
Total expenditures	198.0	154.6	227.3

Table 14

ESTIMATED GENERATION OF FUNDS FROM TARIFFS, CHILE, 1980-1985

(Millions of US dollars at 1980 prices)

Company	Income	Operation and maintenance charges	Balance remaining for investment	Investment proposed 1980-1985
National and Valparaíso	694.80	584.90	109.90	199.59
Santiago	566.35	286.55	279.80	81.97
Total	1 261.15	871.45	389.70	281.56

(iii) The Argentinian example also illustrates the varying proportions of the funds received from different sources to finance the construction of water supply and sanitation systems. The tendency illustrated of variations, in the relative contributions from general government revenues, loans and tariffs is very common and unfortunately does not always reflect deliberate and rational policy choice.

(iv) Commercial loans for water supply and sewerage have not been an important source of finance for most Latin American countries in recent years. Loans from government financial institutions have been important, as in the case of the National Housing Bank in Brazil. Greater maturity of capital markets in the more developed economies of the region could change this situation in the future, particularly if this is coupled with more stringent financial management of water supply and sewerage companies.

(v) External loans have assisted in the financing of water supply and sewerage investments in the past. Over the last two decades they have largely been provided by the World Bank and the Inter-American Development Bank, but in the future foreign commercial bank loans may play a role, as they increasingly do for other public utilities. In the period 1970-1977, loans received in the region for water supply and sanitation totalled some US$ 1.7 billion but were unevenly distributed between the countries with Brazil, Colombia and Mexico receiving almost half of the total (see table 15). Less than 10% of the loans were issued on concessionary terms, and such terms have not been given to any country in the region since the early seventies. It cannot be expected that concessionary loans will be given in future or that the proportion of financing coming from the international banks to the sector will necessarily increase.

The probable financial situation and conclusions relevant for national and international policy formulation

From the foregoing analysis and discussion it may be concluded that the bulk of the financing required to achieve the investment goals established for the International Drinking Water Supply and Sanitation Decade by the countries of Latin America will have to be found within the countries themselves.

Table 15

LATIN AMERICA: LOANS FOR WATER SUPPLY AND
SANITATION PROJECTS, 1970-1977

Country	Amount of loans (Millions of US dollars at 1978 prices)	Percentage of total
Argentina	111.1	6.6
Bahamas	11.0	0.7
Barbados	12.1	0.7
Bolivia	82.7	4.9
Brazil	289.5	17.3
Colombia	285.2	17.1
Costa Rica	28.9	1.7
Chile	14.0	0.8
Ecuador	144.0	8.6
El Salvador	70.1	4.2
Guatemala	87.9	5.3
Guyana	7.4	0.4
Haiti	11.8	0.7
Honduras	26.2	1.6
Jamaica	26.1	1.6
Mexico	201.7	12.1
Nicaragua	50.7	3.0
Panama	34.4	2.1
Paraguay	30.5	1.8
Peru	62.1	3.7
Dominican Republic	35.0	2.1
Trinidad and Tobago	12.4	0.7
Uruguay	37.4	2.2
Total	1 672.2	100.0

Source: PAHO, IBRD and IDB.

/The possibility

The possibility of raising the required capital will be the determining factor for any considerable expansion of the provision of safe drinking water and adequate excreta disposal. In this connexion, as a final step in this study the levels of sectoral investment required to achieve the goals of the Decade have been compared to the expected total of gross fixed capital investment in the 1980s (see tables 16 and 17).

This comparison shows that, in general, the larger and medium-sized economies are capable of generating the required finance. In contrast, the smaller economies, with the exceptions of Costa Rica, Panama and Uruguay, will have considerable difficulty unless the overall level of gross fixed capital formation rises or a very high proportion is dedicated to the sector. It is difficult to establish what might be a reasonable allocation of investment to the sector (if such a concept is meaningful, which it may not be). A cursory review of the proportional distribution of gross capital formation in various countries of the world would suggest that it would be doubtful if an allocation of more than 5% of the total could be considered reasonable, irrespective of the overall total.7/ In any one year, this proportion might be increased but it is doubtful that a higher proportion could be maintained in the longer run. If 5% is accepted as a reasonable guide, then Peru amongst the medium-sized economies and Bolivia, Ecuador, El Salvador, Guatemala, Honduras, and Haiti of the smaller economies will have considerable difficulty in making available from domestic sources the investment required to meet the goals they have set themselves for the Decade (see table 16). If complete coverage of the population is accepted as the goal then Colombia, from the medium-sized economies, and Paraguay, Nicaragua and the Dominican Republic, amongst the small economies, would also appear to have difficulty in raising sufficient finance domestically, and Brazil and Chile could also have difficulty in satisfying the financial demands generated internally.

7/ This estimate is based upon a review of the general proportion of investment dedicated to public utilities in all countries on the basis of information provided in United Nations, Yearbook of National Account Statistics, 1977, Vol. 1, Country Tables.

Table 16

ESTIMATED PROPORTION OF EXPECTED GROSS CAPITAL FORMATION REQUIRED FOR INVESTMENT
IN DRINKING WATER SUPPLY AND SANITATION TO ACHIEVE COUNTRY GOALS, 1977-1990

| | Water supply | | | | | | Excreta disposal | | | | | | Total sector | |
| | Urban | | Rural | | Subtotal | | Urban | | Rural | | Subtotal | | | |
	1977	1990	1977	1990	1977	1990	1977	1990	1977	1990	1977	1990	1977	1990
Large economies														
Argentina	0.45	0.49	0.07	0.17	0.52	0.66	0.97	1.19	0.01	0.05	0.98	1.24	1.50	1.90
Brazil	1.05	1.38	0.20	0.23	1.25	1.61	1.12	1.74	0.03	0.04	1.15	1.79	2.40	3.40
Mexico	0.78	0.84	0.23	0.31	1.02	1.15	1.14	1.27	0.09	0.25	1.23	1.52	2.25	2.60
Medium sized economies														
Colombia	1.74	2.36	0.94	2.14	3.30	3.88	1.83	2.10	0.04	0.12	1.95	2.14	5.25	6.00
Chile a/	1.73	2.21	0.84	1.23	2.56	3.44	1.40	3.11	0.00	0.00	1.40	3.11	3.96	6.50
Peru	3.14	3.83	0.61	1.29	3.74	5.12	2.62	4.75	0.22	0.23	2.83	4.98	6.57	10.10
Venezuela	0.59	1.02	0.12	0.21	0.72	1.23	0.58	0.77	0.01	0.01	0.59	0.78	1.31	2.00
Small economies														
Bolivia	2.91	5.42	1.61	8.19	4.52	13.61	2.12	4.42	0.22	1.26	2.35	5.69	6.87	19.30
Costa Rica	0.64	0.76	0.51	1.07	1.15	1.83	1.28	1.77	0.05	0.17	1.33	1.94	2.48	3.70
Dominican Republic	1.37	1.42	0.76	0.83	2.13	2.25	2.07	2.35	0.19	0.14	2.17	2.49	4.30	4.70
Ecuador	1.82	2.05	3.13	8.58	4.95	10.64	1.88	2.94	0.38	1.66	2.26	4.60	7.21	15.20
El Salvador	3.39	3.44	1.39	1.56	4.83	4.95	3.53	4.52	0.03	0.22	3.56	4.74	8.39	9.60
Guatemala	2.00	2.34	0.82	0.99	2.82	3.33	1.85	4.19	0.19	0.86	2.04	5.06	4.86	8.30
Haiti	1.98	5.12	0.88	2.42	2.86	7.54	1.58	5.29	3.63	4.07	5.20	9.35	8.06	16.80
Honduras	2.98	3.31	0.48	0.84	3.79	3.83	3.44	4.02	1.02	1.17	4.61	5.05	8.40	8.80
Nicaragua	1.55	1.62	0.94	0.94	2.49	2.57	1.39	1.40	0.06	0.09	1.46	1.48	3.95	4.00
Panama	0.83	1.01	0.25	0.34	1.18	1.26	1.13	2.10	0.02	0.04	1.17	2.12	2.35	3.30
Paraguay	2.15	2.19	0.55	3.06	2.74	5.22	1.82	1.94	0.26	0.72	2.08	2.66	4.82	7.80
Uruguay	1.89	1.90	0.18	0.49	2.08	2.39	0.61	3.72	0.01	0.02	0.62	3.74	2.70	6.10

a/ The absence of investment in rural sanitation in Chile reflects the absolute decline expected in the rural population rather than the need for improvements in sanitation.

Table 17

ESTIMATED PROPORTION OF EXPECTED GROSS CAPITAL FORMATION REQUIRED FOR INVESTMENT IN
DRINKING WATER SUPPLY AND SANITATION TO ACHIEVE COMPLETE COVERAGE, 1977-1990

| | Water supply | | | | | | Excreta disposal | | | | | | Total sector | |
| | Urban | | Rural | | Subtotal | | Urban | | Rural | | Subtotal | | | |
	1977	1990	1977	1990	1977	1990	1977	1990	1977	1990	1977	1990	1977	1990
Large economies														
Argentina	0.83	0.91	0.26	0.58	1.09	1.50	1.65	2.02	0.01	0.05	1.66	2.07	2.75	3.57
Brazil	1.49	1.96	0.83	0.92	2.31	2.88	1.95	3.05	0.12	0.18	2.07	3.23	4.38	6.11
Mexico	1.18	1.26	0.52	0.70	1.70	1.96	1.87	2.09	0.09	0.25	1.96	2.34	3.66	4.30
Medium-sized economies														
Colombia	2.18	2.96	1.45	3.31	4.41	5.49	2.98	3.43	0.04	0.12	3.11	3.47	7.52	8.96
Chile a/	1.73	2.21	1.07	1.58	2.80	3.79	2.06	4.57	0.00	0.00	2.06	4.57	4.86	8.36
Peru	4.49	5.47	1.59	3.38	6.07	8.85	4.39	7.97	0.64	0.68	5.03	8.65	11.10	17.50
Venezuela	0.89	1.53	0.19	0.33	1.08	1.86	1.15	1.53	0.01	0.01	1.16	1.54	2.24	3.40
Small economies														
Bolivia	2.91	5.42	4.13	20.98	7.03	26.40	3.36	7.00	0.68	3.85	4.04	10.85	11.07	37.25
Costa Rica	0.64	0.76	0.65	1.36	1.29	2.12	1.28	1.77	0.05	0.17	1.33	1.94	2.62	4.06
Dominican Republic	2.04	2.12	2.33	2.52	4.37	4.65	3.22	3.65	0.27	0.39	3.49	4.04	8.14	8.41
Ecuador	1.82	2.05	3.13	8.58	4.95	10.64	1.88	2.94	0.38	1.66	2.26	4.60	7.21	15.24
El Salvador	3.39	3.44	4.03	4.53	7.47	7.92	4.03	5.16	0.09	0.78	4.12	5.94	11.59	13.86
Guatemala	3.22	3.77	5.06	6.13	8.29	9.90	2.50	5.68	0.25	1.12	2.74	6.79	11.03	16.69
Haiti	4.78	12.30	11.70	32.32	16.48	44.62	5.26	17.62	11.23	12.60	16.49	30.22	32.97	74.84
Honduras	4.43	4.92	3.96	6.91	8.88	11.34	6.25	7.32	1.40	1.62	7.87	8.72	16.75	20.04
Nicaragua	2.25	2.36	2.05	2.05	4.30	4.41	3.78	3.83	0.24	0.38	4.06	4.16	8.36	8.57
Panama	0.83	1.01	0.77	1.05	1.78	1.89	1.40	2.60	0.07	0.13	1.53	2.67	3.42	4.45
Paraguay	3.35	3.41	1.37	7.66	4.78	11.01	3.77	4.01	0.26	0.72	4.03	4.74	8.81	15.75
Uruguay	1.89	1.90	0.18	0.49	2.08	2.39	0.61	3.72	0.01	0.02	0.62	3.74	2.70	6.13

a/ See table 16.

It is clear, therefore, from even this brief and superficial analysis that if complete coverage is to be a goal, or if for many countries even the more modest goals now set are to be met, then some alleviation of the financial burden will be necessary. Such alleviation could come from two sources, external assistance or reduction of investment requirements through the adoption of non-traditional and lower cost technologies, particularly for sanitation.

Allusion has already been made to the external loans received by the sector in the past. The World Health Organization estimates that globally external sources have contributed about 10% of total financing of water supply and sanitation. In recent years, it has fallen below this percentage in Latin America. If, in the future, external assistance was to be maintained at the current level of around 8% of investment in the sector, then the contribution required could reach a maximum of some US$ 378 million a year during the decade compared to the average US$ 209 million in the period 1970-1977. This increase may be practicable if the international banks give a higher priority to the sector. More important, perhaps, is the distribution of these funds. The pattern of external financing in the past, heavily weighted to a few of the larger countries and to urban water supply and sewerage, must change if the goals in the smaller and less-developed countries and for the rural population of the region are to be met. Such a shift in the pattern of lending may be difficult, however, unless the management and operation of the sector is improved in many countries.

Finally, a contribution may be made to the financing problem by the adoption of non-traditional technologies in excreta collection and disposal. There is less room for cost-saving innovations in water supply although savings may result from the use of water-saving excreta disposal technology. These technologies can dramatically reduce investment costs per household, while providing high quality service. Some of the more radical innovations may not be practical except in areas where conventional sewerage has not yet become widespread. Other technologies are only suitable for rural areas but these are currently the least served and least provided with means of responding to the present lack of adequate sanitation.

Finally, it cannot be concluded that financial support or the lack of it is the only element which will determine the achievement of a major expansion in the supply of safe drinking water and adequate sanitation. Of equal importance is good management, which must include the adoption of stable policies towards the sector, viable long-term strategies for its development, the availability of adequate and trained staff and the development of rational management practices to conserve existing installations and maximize their utility.

Annex

Estimate of the future coverage of drinking water and sanitation services in Latin America

The estimate of the future coverage of drinking water and sanitation services rests basically on the following hypothesis:[8]/

A higher level of income should correspond to a greater coverage of services:

Coverage = a + b . ln (Income)

Substituting: Coverage (%) = C

Y = Per capita income

t (subscript) = Year

gives:

Ct = a + b . ln (Y_t)

Applying this relation for any two points in time t_1 and t_0 gives:

$C_{t_1} - C_{t_0} = b \cdot \underline{/}\ln (Y_{t_1}) = \ln (Y_{t_0})\underline{/}$

Whence:

$C_{t_1} = C_{t_0} + b \cdot \underline{/}\ln (Y_{t_1}) - \ln (Y_{t_0})\underline{/}$

Thus, if the future growth of income is known, the future growth of coverage may be estimated starting from known coverage.

Clearly, in order to be able to apply the final equation it is essential to estimate first:

(1) the value of coefficient b, and

(2) the future growth of per capita income.

Since the estimates of coverage refer to measurements at the country level, the measure of income used was the Gross National Product (GNP).

Estimate of coefficient b

To solve this problem it was assumed that for each service the equation given above was applicable to each and every country in Latin America. In other words, the parameters a and b of the equation are the same for all countries (in each service). These assumptions made it possible to estimate coefficients a and b by means of linear regression analysis between the values of coverage and the natural logarithm of per capita income, applied to the set of 19 countries under consideration.

8/ Originally developed by the World Bank.

/The data

The data used in the regression analysis are for 1977 and are taken from the coverage estimates obtained in CEPAL and the estimates made by the World Bank for GNP as published in the World Bank Atlas 1979. The values are given in table 1.

The regression analysis using the data for the 19 countries of Latin America produced the results shown in the following table.

	Drinking water			Excreta disposal		
	Whole country	Urban	Rural	Whole country	Urban	Rural
R2	.766	.614	.520	.684	.600	.641
Coefficient b of the regression equation	26.952.45	21.682.55	13.344.32	25.121.31	18.762.66	37.043.37
Student's t	4.911	3.211	2.510	3.869	3.092	3.443

It should be pointed out that the excreta disposal service in urban areas corresponds to sewerage connected to the public mains, while in the rural area it also includes septic tanks and sanitary latrines. Consequently, the total country coverage refers to a heterogeneous type of service in the sense that it varies between urban and rural areas.

Future income trends

Here use was made of the CEPAL document "Long-term trends and prospects of the development of Latin America" (E/CEPAL/1076) prepared for the Commission's eighteenth session. The document contains two GDP growth hypotheses, one of which assumes that past trends will continue while the other assumes a moderate acceleration.

As in Latin America the GDP growth rates of countries vary, the 19 countries in the study were broken down into three groups. These groups are:

Large countries: Argentina, Brazil and Mexico;

Medium-size countries: Colombia, Chile, Peru and Venezuela;

Small countries: Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Haiti Honduras, Nicaragua, Panama, Paraguay, the Dominican Republic and Uruguay.

Table 1

BASIC DATA USED IN THE REGRESSION ANALYSIS

Country	Service coverage (percentage)						Per capita Gross National Product, 1977 (dollars at 1978 prices) a/
	Drinking water			Sanitation			
	Country total	Urban	Rural	Country total	Urban	Rural	
Argentina	59.6	70.0	14.0	39.1	33.0	66.0	1 870.7
Bolivia	12.8	30.0	2.0	14.4	31.0	4.0	477.6
Brazil	44.6	66.0	10.0	55.4	65.0	40.0	1 439.3
Colombia	62.3	80.0	29.0	80.2	76.0	88.0	750.3
Costa Rica	75.3	95.0	60.0	65.1	42.0	83.0	1 391.8
Chile	66.0	81.0	8.0	58.2	50.0	90.0	1 247.4
Dominican Republic	36.2	66.0	12.0	34.2	27.0	40.0	760.3
Ecuador	34.7	73.0	6.0	32.7	63.0	10.0	819.9
El Salvador	24.9	54.0	3.0	26.6	34.0	21.0	571.4
Guatemala	25.2	58.0	6.0	25.5	40.0	17.0	806.3
Haiti	4.0	17.0	0.0	3.8	0.0	5.0	201.7
Honduras	36.6	75.0	13.0	.23.2	43.0	11.0	425.0
Mexico	56.4	70.0	32.0	38.8	41.0	35.0	1 165.1
Nicaragua	38.2	65.0	9.0	28.4	38.0	18.0	844.1
Panama	53.9	92.0	12.0	61.1	74.0	47.0	1 201.1
Paraguay	11.0	27.0	0.0	70.1	38.0	92.0	760.9
Peru	35.9	55.0	3.0	27.3	42.0	2.0	726.3
Uruguay	66.7	75.0	24.0	57.6	54.0	76.0	1 453.5
Venezuela	57.2	65.0	31.0	70.3	65.0	88.0	2 621.2

a/ Obtained from figures published on Gross National Product by the World Bank and on population by CELADE.

/The general

The general equation used to describe the growth of GDP is:

$$(GDP)^{t_1} = (GDP)^{t_0} \times (1+r)^{(t_1 - t_0)}$$

The GDP growth rates were taken from tables 6 to 8 and 14 to 16 of the above-mentioned document, which include past and future GDP growth rates for each group of countries for different periods.

For purposes of comparability irrelevant to this study, it was decided to give the figures for the product in United States dollars at 1978 prices. As information is not available on the GDP at current prices in 1978 for some countries of Latin America, the value of the GDP in US dollars at 1978 prices could not be calculated. As the World Bank had already estimated and published figures for GNP in US dollars at current 1978 prices in the 1979 World Bank Atlas, it was therefore decided to use the value of the gross national product as the measure of income.

In projecting GNP values, it was assumed that GNP would grow at the same growth rates as given in the CEPAL document for GDP, and the two hypotheses considered in the above-mentioned document were applied.

In order to calculate per capita income, the projected GNP was divided by the population estimates published by CELADE in Boletín Demográfico No. 25 (January 1980).

The projected GNP values, the base value (1978) and the corresponding per capita values are given in tables 2 and 3.

Once the values of coefficient b for each service and the future growth of per capita income had been estimated, projections were made of the values of coverage starting from the situation in 1977. The results appear in tables 4 to 9.

Table 2

LATIN AMERICA: GROSS NATIONAL PRODUCT PROJECTIONS BASED ON THE HYPOTHESIS OF CONTINUATION OF TRENDS IN
GROWTH OF GROSS DOMESTIC PRODUCT AND CORRESPONDING PER CAPITA VALUES, BY GROUPS OF COUNTRIES

(Dollars at 1978 prices)

Country	Total (millions)				Per capita			
	1978	1980	1985	1990	1978	1980	1985	1990
Large countries								
Argentina	50 250	56 248	77 427	107 082	1 905.4	2 080.5	2 698.8	3 536.7
Brazil	187 190	209 534	288 430	398 898	1 604.9	1 713.0	2 101.8	2 604.3
Mexico	84 150	94 194	129 662	179 322	1 286.3	1 346.3	1 565.9	1 837.6
Medium-sized countries								
Colombia	21 790	24 207	31 488	40 959	850.7	900.1	1 034.8	1 194.2
Chile	15 180	16 864	21 936	28 534	1 414.5	1 518.7	1 816.8	2 184.7
Peru	12 440	13 820	17 976	23 383	745.4	784.1	886.7	1 001.2
Venezuela	40 710	45 225	58 828	76 522	2 910.1	3 029.2	3 365.5	3 786.4
Small countries								
Bolivia	2 690	2 983	3 880	5 071	509.0	535.5	609.0	693.3
Costa Rica	3 250	3 604	4 688	6 126	1 539.6	1 628.4	1 886.3	2 206.9
Dominican Republic	4 680	5 189	6 750	8 822	827.9	873.3	1 006.0	1 171.6
Ecuador	6 890	7 640	9 938	12 988	913.4	952.5	1 059.4	1 186.2
El Salvador	2 810	3 116	4 053	5 297	621.1	649.5	730.0	816.9
Guatemala	6 040	6 697	8 712	11 386	883.2	922.2	1 036.7	1 176.7
Haiti	1 240	1 375	1 788	2 337	224.1	236.7	271.6	311.3
Honduras	1 650	1 830	2 380	3 110	479.8	495.7	544.3	609.3
Nicaragua	2 100	2 328	3 029	3 959	820.6	852.0	941.2	1 047.8
Panama	2 350	2 606	3 389	4 430	1 299.8	1 374.3	1 601.1	1 888.3
Paraguay	2 450	2 717	3 534	4 618	863.3	904.3	1 018.9	1 160.1
Uruguay	4 660	5 167	6 721	8 784	1 614.7	1 767.1	2 213.8	2 774.6

a/ The Gross National Product projections are based on figures published by the World Bank in the World Bank Atlas,
1979.

Table 3

LATIN AMERICA: GROSS NATIONAL PRODUCT PROJECTIONS BASED ON THE HYPOTHESIS OF MODERATE ACCELERATION OF GROWTH OF GROSS DOMESTIC PRODUCT AND CORRESPONDING PER CAPITA VALUES, BY GROUPS OF COUNTRIES

(Dollars at 1978 prices)

Country	Total (millions)				Per capita			
	1978a/	1980	1985	1990	1978	1980	1985	1990
Large countries								
Argentina	50 250	56 248	81 128	117 012	1 905.4	2 080.5	2 827.8	3 864.7
Brazil	187 190	209 534	302 215	435 890	1 604.9	1 713.0	2 202.2	2 845.8
Mexico	84 150	94 194	135 858	195 951	1 286.3	1 346.3	1 640.7	2 008.0
Medium-sized countries								
Colombia	21 790	24 207	33 321	45 868	850.7	900.1	1 095.1	1 337.3
Chile	15 180	16 864	23 213	31 954	1 414.5	1 518.7	1 922.6	2 446.5
Peru	12 440	13 820	19 023	26 186	745.4	784.1	938.4	1 121.2
Venezuela	40 710	45 225	62 254	85 695	2 910.1	3 029.2	3 561.5	4 240.2
Small countries								
Bolivia	2 690	2 983	4 144	5 759	509.0	535.5	650.5	787.3
Costa Rica	3 250	3 604	5 007	6 957	1 539.6	1 628.4	2 015.0	2 506.3
Dominican Republic	4 680	5 189	7 210	10 019	827.9	873.3	1 074.6	1 330.5
Ecuador	6 890	7 640	10 615	14 750	913.4	952.5	1 131.7	1 347.1
El Salvador	2 810	3 116	4 329	6 016	621.1	649.5	779.8	927.8
Guatemala	6 040	6 697	9 306	12 930	883.2	922.2	1 107.4	1 336.3
Haiti	1 240	1 375	1 910	2 655	224.1	236.7	290.1	353.5
Honduras	1 650	1 830	2 542	3 532	479.8	495.7	581.5	691.9
Nicaragua	2 100	2 328	3 235	4 496	820.6	852.0	1 005.4	1 189.9
Panama	2 350	2 606	3 621	5 031	1 299.8	1 374.3	1 710.3	2 144.4
Paraguay	2 450	2 717	3 775	5 245	863.3	904.3	1 088.4	1 317.5
Uruguay	4 660	5 167	7 180	9 976	1 614.7	1 767.1	2 364.8	3 151.0

a/ The Gross National Product projections are based on figures published by the World Bank in the World Bank Atlas, 1979.

Table 4

DRINKING WATER COVERAGE ESTIMATED BY REGRESSION BASED ON THE HYPOTHESIS
OF MAINTENANCE OF THE GROSS DOMESTIC PRODUCT GROWTH TREND

(Percentages)

Country	Urban			Rural			Country total a/		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Argentina	72.3	77.9	83.8	15.4	18.9	22.5	62	69	75
Bolivia	32.5	35.3	38.1	3.5	5.2	7.0	15	18	21
Brazil	69.8	74.2	78.9	12.3	15.1	17.9	49	55	62
Colombia	83.9	87.0	90.1	31.4	33.3	35.2	67	72	76
Costa Rica	98.4	100.0b/	100.0b/	62.1	64.1	66.2	79	82c/	84c/
Chile	85.3	89.2	93.2	10.6	13.0	15.5	71	77	82
Dominican Republic	69.0	72.1	75.4	13.8	15.7	17.8	40	45	50
Ecuador	76.3	78.6	81.0	8.0	9.4	10.9	38	42	45
El Salvador	56.8	59.3	61.7	4.7	6.3	7.8	28	31	34
Guatemala	60.9	63.4	66.2	7.8	9.4	11.0	28	31	35
Haiti	20.5	23.5	26.4	2.1	4.0	5.8	7	9	12
Honduras	78.3	80.4	82.8	15.1	16.3	17.8	40	44	49
Mexico	73.1	76.4	79.9	33.9	35.9	38.1	60	64	69
Nicaragua	65.2	67.4	69.7	9.1	10.5	11.9	40	43	47
Panama	94.9	98.2	100.0b/	13.8	15.8	18.0	58	63	68c/
Paraguay	30.7	33.3	36.1	2.3	3.9	5.6	14	17	20
Peru	56.7	59.3	62.0	4.0	5.7	7.3	38	43	47
Uruguay	79.2	84.1	89.0	26.6	29.6	32.6	71	77	82
Venezuela	68.1	70.4	73.0	32.9	34.3	35.9	61	64	67

a/ Obtained by weighting the urban and rural figures by the corresponding population.
b/ The projection indicates sufficient capacity to exceed 100 per cent coverage.
c/ Recalculated assuming that although one area has sufficient capacity to exceed 100 per cent coverage.
the surplus investment is not shifted to the other area.

Table 5

COVERAGE OF SANITATION SERVICE ESTIMATED BY REGRESSION BASED ON THE HYPOTHESIS
OF MAINTENANCE OF THE GROSS DOMESTIC PRODUCT GROWTH TREND

(Percentages)

Country	Urban			Rural			Country total a/		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Argentina	35.0	39.9	44.9	69.9	79.6	89.6	41	46	51
Bolivia	33.1	35.6	38.0	8.2	13.0	17.8	18	23	27
Brazil	68.3	72.1	76.1	46.4	54.0	62.0	60	66	72
Colombia	79.4	82.0	84.7	94.7	99.9	100.0b/	84	87	89c/
Costa Rica	44.9	47.7	50.6	88.8	94.3	100.0b/	69	71	74
Chile	53.7	57.1	60.5	97.3	100.0b/	100.0b/	62	64c/	66c/
Dominican Republic	29.6	32.3	35.1	45.1	50.4	56.0	38	41	44
Ecuador	65.8	67.8	69.9	15.6	19.5	23.7	38	42	46
El Salvador	36.4	38.6	40.7	25.7	30.1	34.2	30	34	37
Guatemala	42.5	44.7	47.1	22.0	26.3	31.0	30	34	38
Haiti	3.0	5.6	8.1	10.9	16.0	21.1	9	13	17
Honduras	45.9	47.6	49.8	16.7	20.2	24.3	28	32	36
Mexico	43.7	46.5	49.5	40.4	46.0	51.9	43	46	50
Nicaragua	38.2	40.0	42.1	18.3	22.0	26.0	29	32	36
Panama	76.5	79.4	82.5	52.0	57.6	63.8	65	70	75
Paraguay	41.2	43.5	45.9	98.4	100.0b/	100.0b/	74	75c/	75c/
Peru	43.4	45.7	48.0	4.8	9.4	13.9	30	34	39
Uruguay	57.7	61.9	66.1	83.2	91.6	99.9	62	66	70
Venezuela	67.7	69.7	71.9	93.4	97.3	101.6	73	75	77

a/ Obtained by weighting the urban and rural figures by the corresponding population.

b/ The projection indicates sufficient capacity to exceed 100 per cent coverage.

c/ Recalculated assuming that although one area has sufficient capacity to exceed 100 per cent coverage, the surplus investment is not shifted to the other area.

/Table 6

Table 6

PROJECTION OF TOTAL COUNTRY COVERAGE a/ ON THE HYPOTHESIS OF
CONTINUATION OF THE GROSS DOMESTIC PRODUCT GROWTH TREND

Country	Drinking water			Excreta disposal		
	1980	1985	1990	1980	1985	1990
Argentina	62.5	69.5	76.8	41.8	48.3	55.1
Bolivia	15.9	19.4	22.8	17.3	20.5	23.8
Brazil	49.3	54.8	60.6	59.8	64.9	70.3
Colombia	67.2	71.0	74.8	84.8	88.3	91.9
Costa Rica	79.5	83.5	87.7	69.0	72.7	76.7
Chile	71.3	76.1	81.1	63.1	67.6	72.3
Dominican Republic	39.9	43.7	47.9	37.7	41.2	45.1
Ecuador	38.7	41.6	44.7	36.5	39.1	42.0
El Salvador	28.4	31.5	34.5	29.8	32.8	35.6
Guatemala	28.8	32.0	35.4	28.9	31.8	35.0
Haiti	8.3	12.0	15.7	7.8	11.3	14.7
Honduras	40.7	43.3	46.3	27.1	29.4	32.2
Mexico	60.3	64.4	68.7	42.4	46.2	50.2
Nicaragua	38.5	41.1	44.0	28.6	31.1	33.8
Panama	57.5	61.6	66.1	64.5	68.3	72.5
Paraguay	15.7	18.9	22.4	74.4	77.4	80.7
Peru	38.0	41.3	44.6	29.2	32.3	35.4
Uruguay	72.0	78.0	84.1	62.5	68.2	73.8
Venezuela	61.1	63.9	67.1	73.9	76.6	79.5

a/ Estimated directly by regression, without breakdown by urban and rural areas.

Table 7

DRINKING WATER COVERAGE ESTIMATED BY REGRESSION ON THE HYPOTHESIS
OF MODERATE ACCELERATION OF GROSS DOMESTIC PRODUCT GROWTH

(Percentages)

Country	Urban			Rural			Country total a/		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Argentina	72.3	79.0	85.7	15.4	19.5	23.7	62	70	77
Bolivia	32.5	36.7	40.8	3.5	6.1	8.7	15	19	23
Brazil	69.8	75.2	80.8	12.3	15.7	19.1	49	56	63
Colombia	83.9	88.2	92.5	31.4	34.0	36.7	67	73	78
Costa Rica	98.4	100.0b/	100.0b/	62.1	64.9	67.8	79	82c/	85c/
Chile	85.3	90.4	95.6	10.6	13.8	17.0	71	78	84
Dominican Republic	69.0	73.5	78.1	13.8	16.6	19.5	40	46	52
Ecuador	76.3	80.0	83.8	8.0	10.2	12.6	38	43	48
El Salvador	56.8	60.7	64.5	4.7	7.1	9.5	28	32	37
Guatemala	60.9	64.9	69.0	7.8	10.7	12.7	28	33	37
Haiti	20.5	24.9	29.2	2.1	4.8	7.5	7	10	14
Honduras	78.3	81.8	85.6	15.1	17.2	19.5	40	46	51
Mexico	73.1	77.4	81.8	33.9	36.6	39.3	60	65	70
Nicaragua	65.2	68.8	72.4	9.1	11.3	13.6	40	45	50
Panama	94.9	99.7	100.0b/	13.8	16.7	19.7	58	65	69c/
Paraguay	30.7	34.8	38.9	2.3	4.8	7.3	14	18	22
Peru	56.7	60.6	64.4	4.0	6.4	8.8	38	44	49
Uruguay	79.2	85.6	91.8	26.6	30.5	34.3	71	78	85
Venezuela	68.1	71.6	75.4	32.9	35.1	37.4	61	65	69

a/ Obtained by weighting the urban and rural figures by the corresponding population.

b/ The projection indicates sufficient capacity to exceed 100 per cent coverage.

c/ Recalculated assuming that although one area has sufficient capacity to exceed 100 per cent coverage, the
surplus investment is not shifted to the other area.

Table 8

COVERAGE OF SANITATION SERVICE ESTIMATED BY REGRESSION ON THE HYPOTHESIS
OF MODERATE ACCELERATION OF GROSS DOMESTIC PRODUCT GROWTH

Country	Urban			Rural			Country total a/		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Argentina	35.0	40.8	46.6	69.9	81.3	92.9	41	47	53
Bolivia	33.1	36.8	40.4	8.2	15.4	22.5	18	25	31
Brazil	68.3	73.0	77.8	46.4	55.8	65.3	60	67	74
Colombia	79.4	83.1	86.8	94.7	100.0b/	100.0b/	84	88c/	90c/
Costa Rica.	44.9	48.9	53.0	88.8	96.7	100.0b/	69	73	75c/
Chile	53.7	58.1	62.6	97.3	100.0b/	100.0b/	62	65c/	68c/
Dominican Republic	29.6	35.5	37.5	45.1	52.8	60.7	38	43	48
Ecuador	65.8	69.0	72.3	15.6	21.9	28.4	38	44	50
El Salvador	36.4	39.8	43.1	25.7	32.5	39.0	30	36	41
Guatemala	42.5	46.0	49.5	22.0	28.8	35.7	30	36	42
Haiti	3.0	6.8	10.5	10.9	18.5	25.8	9	15	21
Honduras	45.9	48.9	52.1	16.7	22.6	29.1	28	34	40
Mexico	43.7	47.4	51.2	40.4	47.7	55.2	43	48	52
Nicaragua	38.2	41.3	44.4	18.3	24.5	30.7	29	34	39
Panama	76.5	80.6	84.9	52.0	60.1	68.5	65	72	78
Paraguay	41.2	44.7	48.3	98.4	100.0b/	100.0b/	74	75c/	76c/
Peru	43.4	46.8	50.1	4.8	11.5	18.1	30	36	41
Uruguay	57.7	63.1	68.5	83.2	94.0	100.0b/	62	67	72c/
Venezuela	67.7	70.8	74.0	93.4	99.4	100.0b/	73	76	78c/

a/ Obtained by weighting the urban and rural figures by the corresponding population.

b/ The projection indicates sufficient capacity to exceed 100 per cent coverage.

c/ Recalculated assuming that although one area has sufficient capacity to exceed 100 per cent coverage, the
surplus investment is not shifted to the other area.

Table 9

PROJECTION OF TOTAL COUNTRY COVERAGE[a/] USING THE HYPOTHESIS OF MODERATE
ACCELERATION OF GROSS DOMESTIC PRODUCT GROWTH

Country	Drinking water			Excreta disposal		
	1980	1985	1990	1980	1985	1990
Argentina	62.5	70.7	79.2	41.8	49.5	57.3
Bolivia	15.9	21.1	26.3	17.3	22.2	27.0
Brazil	49.3	56.1	63.0	59.8	66.1	72.5
Colombia	67.2	72.5	77.9	84.8	89.7	94.7
Costa Rica	79.5	85.3	91.2	69.0	74.4	79.9
Chile	71.3	77.7	84.2	63.1	69.1	75.1
Dominican Republic	39.9	45.5	51.3	37.7	42.9	48.3
Ecuador	38.7	43.4	48.1	36.5	40.8	45.2
El Salvador	28.4	33.3	38.0	29.8	34.4	38.8
Guatemala	28.8	33.8	38.8	28.9	33.5	38.2
Haiti	8.3	13.8	19.1	7.8	12.9	17.9
Honduras	40.7	45.1	49.7	27.1	31.1	35.4
Mexico	60.3	65.6	71.1	42.4	47.4	52.5
Nicaragua	38.5	42.9	47.5	28.6	32.8	37.0
Panama	57.5	63.4	69.5	64.5	70.0	75.7
Paraguay	15.7	20.6	25.8	74.4	79.1	83.9
Peru	38.0	42.8	47.6	29.2	33.7	38.2
Uruguay	72.0	79.8	87.6	62.5	69.8	77.0
Venezuela	61.1	65.5	70.2	73.9	78.0	82.4

a/ Estimated directly by regression, without breakdown by urban and rural areas.