THE INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE DIRECTORY

Edition 3

COUNTRY GUIDE

THE INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE DIRECTORY

Edition 3

CATALOGUE OF EXTERNAL SUPPORT AND CONSULTANTS DIRECTORY

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THE INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE DIRECTORY

Edition 3

"All peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs.
Similar considerations apply to all that concerns the disposal of waste water, including sewage, industrial and agricultural wastes and other harmful sources, which are the main task of the public sanitation systems of each country."

UN Water Conference, Mar Del Plata, Argentina. March 1977

The International Drinking Water Supply & Sanitation Decade (IDWSSD) was proclaimed at a Special Session of the United Nations General Assembly in New York on 10 November 1980. Within the spirit of the target that everyone in the world should by 1990 have access to a safe supply of drinking water and adequate means of sanitation if possible, each country was asked to set its own targets giving appropriate priority to the sector.

In the first edition of the *IDWSSD Directory*, published in 1981, baseline data for 116 developing countries were based primarily on sector digests and rapid assessment reports compiled by experts from the World Bank and the World Health Organisation. Some 26 external support agencies contributed policy statements on their activities in the water and sanitation sector.

The second edition of the *IDWSSD Directory*, the number of developing countries covered was expanded to 136 and policy statements from almost 100 external support agencies were included.

New Edition

This latest edition of the *IDWSSD Directory* makes a number of radical departures from its predecessors to improve and expand the information available.

Firstly, the directory has been split into two volumes *Country Guide* and *Catalogue of External Support and Consultants Directory*. This should make it less bulky and more easy to handle.

Secondly, the 97 entries in the *Catalogue of External Support* have been compressed into a more easily digestable form, concentrating on the agencies' objectives, priorities, methods of working and areas of operation.

In addition, the second volume of the directory includes a listing of the names, addresses and contact numbers of 242 international consulting engineering firms active in the water sector.

The number of countries covered by the *Country Guide* has risen yet again to 156, primarily due to the inclusion for the first time of some developed countries from which the World Health Organisation has been gathering statistics.

How to use this directory

Volume 1 - Country Guide

The first volume of the IDWSSD Directory, *Country Guide*, contains information relating to IDWSSD activities in 138 developing countries plus 17 European nations and Japan. The countries are presented in alphabetical order but are are also indexed on pages 10-11.

In order to provide a degree of standardisation for information which has been collected from a varied selection of sources, each country entry is divided into three sections:

- Basic indicators, including currency, population and population growth rate, official language, GNP per capita, life expectancy, infant mortality, incidence of water-related disease, adult literacy levels.
- Addresses of water and sanitation agencies, plus the address of the resident representative of the UN Development Programme who coordinates IDWSSD activities.
- Country description, including geographical, hydrological and climatic details, plus a description of the current water supply and sanitation position and the aims for the rest of the IDWSSD. These are supplemented with tables where the statistics are available.

Volume 2 - Catalogue of External Support and Consultants Directory

The second volume of the *IDWSSD Directory* details the policies and IDWSSD-related activities of:

1. Development banks and funds.
2. Bilateral funding agencies.
3. United Nations Organisations.
4. Non-governmental organisations.
5. International reference, research and professional organisations.
6. Volunteer organisations.

Entries include official addresses, telephone and telex numbers where available and a statement by the organisation of its aims, policies and activities.

The final section of this volume is a directory of 242 consulting engineering firms listed in alphabetical order.

Sources of information and definitions

Country Guide

a) Basic Indicators

The list of basic indicators at the start of each country guide is intended to give a quick insight into the economic, demographic and social conditions prevailing within the country.

Up to nine indicators are provided. These have been obtained from many sources, the most frequent being questionnaires returned to the Community Water Supply unit at the World Health Organisation, all dated December 1985. These are also the source for all the tables included with the country descriptions. Where no other source is given, the information has come from the questionnaires.

Specific sources are as follows (unless otherwise stated in the country entry):

Currency: The local currency unit is given with its exchange rate against the US dollar. All international exchange rates are based on those published in the UK *Financial Times* on 8 April 1987.

Population: Total population in 1985, taken from WHO questionnaire returns, December 1985. Alternative source: *World Development Report 1987* (World Bank). figure for mid-1985.

Official language: Information compiled from various reference sources.

Population growth rate (%): WHO questionnaire returns, December 1985.

GNP per capita (in US dollars): Figure for 1985 from WHO questionnaire returns. Alternative sources: *World Development Report 1987* (World Bank) 1985 figure; and *State of the World's Children 1987* (UNICEF) 1984 figure.

Life expectancy: As GNP sources, but UNICEF figure is for 1985.

Infant mortality per 1,000 live births: Figure for 1985 from WHO questionnaire returns. Alternative source: *State of the World's Children 1987* (UNICEF), 1985 figure:

Water disease per 100,000: WHO questionnaire returns, 1985 figure.

Adult literacy: *State of the World's Childred 1987* (UNICEF), 1985 percentage.

b) UNDP resident representatives

Responsibility for coordinating IDWSSD activities in each country is given to the relevant United Nations Development Programme representative. The addresses given are taken from a 1987 list provided by UNDP.

c) Country information

New statistical information has been collected by WHO for 104 countries, including 12 countries in Europe that previously had not provided such information. In addition, new country reports have been received by WHO for 34 countries, including two for China and Laos, which had previously not been included in the *IDWSSD Directory*.

Other sources have been publications from the UN Development Programme, such as *Decade Watch*; official government reports from the countries concerned; and official reports contained in *World Water* magazine's files.

In the case of some countries from which no new reports have been received, the old entry from the second edition has been updated and this is stated in the text.

d) Tables

All information in the tables accompanying the country guides has been taken from the returned WHO questionnaires.

e) Water and sanitation agencies

The vast majority of the names, addresses and telephone and telex numbers listed under this heading were provided by the UK embassies of the countries concerned. The remainder were assembled from *World Water* magazine's resources.

Catalogue of External Support and Consultants Directory

See introduction to second volume.

COUNTRY GUIDE

Country Guide

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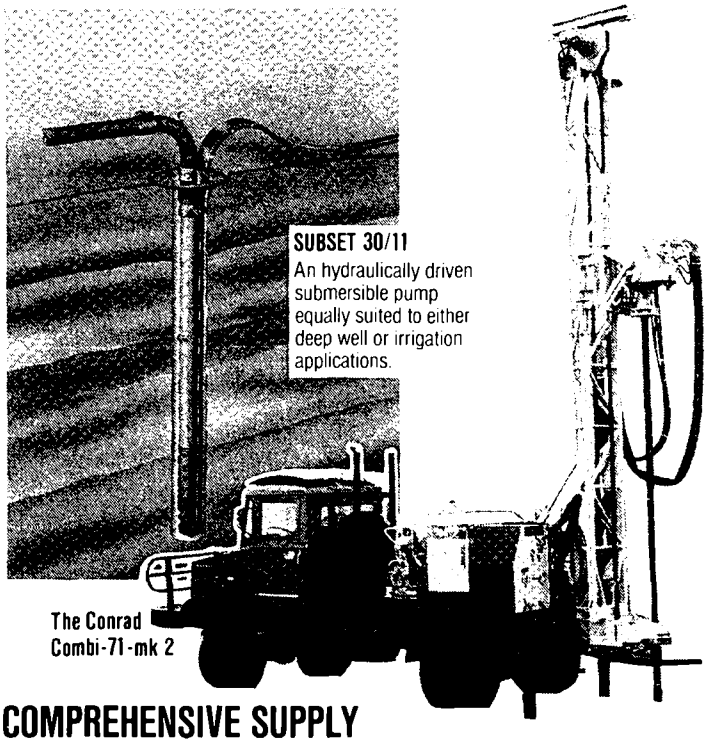
WELL AHEAD



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Afghanistan

Currency: Afgani 50.60 = US$1.00
Population: 16,141,000 (15% urban)
Official language: Dari
Population growth rate: 1.92%
GNP per capita: $163.00
Life expectancy: 41.00
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: 182
Adult literacy (M/F): 39/8

UNDP resident representative: Sardar Shah Mahmoud GhaziWat, PO Box 5, Kabul, Afghanistan

WATER AND SANITATION AGENCIES

Ministry of Public Works, Block 3, Micro Rayon, Kabul
Telex: 41

Ministry of Water & Power, Da Breshna, Kabul
Telex: 44 WAPA

Central Authority for Water Supply, Block 22, Micro Rayon, Kabul

Bordered by the Soviet Union, Iran and Pakistan, Afghanistan is a landlocked country with an area of 636,000km^2. Its topography ranges from the mountainous central massif of the Hindukush, which rises to over 4,500m, to the deserts of the south-west, which lie below 1,500m.

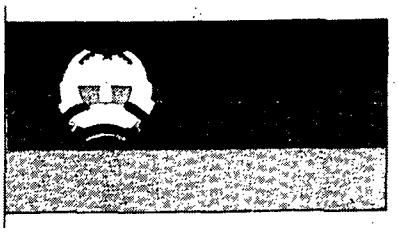
Total population in 1985 was estimated at 16.1 million growing more slowly at 1.92% than the 2.35-2.40% at the start of the Decade. More than 80% of the population live in economically depressed areas.

Average annual precipitation over most of the country is less than 400mm. The low-lying areas in the south are arid, while, in the higher altitudes, heavy snowfall during the winter provides surface runoff throughout the year. Temperatures fluctuate from over 40°C in the arid regions to well below freezing in the highlands in winter.

Decade plans

At the start of the Decade, the government appointed a National Policy Committee at ministerial level and a working committee of officials, at general-director level and above, from the ministries and departments concerned. Immediate and action plans were to be drawn up for 1981-85 and prospective plans for 1986-90.

The government also set up a Water Supply & Sanitation Secretariat (WSSS) in the State Planning Committee to coordinate the planning and monitoring of the implementation of programmes to be launched and to achieve the Decade's objectives. The UN Development Programme and the World Health Organisation set up a project to strengthen the WSSS with consultancy



services, training facilities, workshops and equipment.

Organisation and agencies

Three main agencies are directly responsible for sector development:

- Central Authority for Water & Sewerage (CAWS);
- Ministry of Irrigation; and
- Kabul Municipality

CAWS was established in 1975 under the Ministry of Public Works to supply safe drinking water to the people. In practice, its activities are confined mainly to urban areas.

Kabul Municipality is a government department under the Council of Ministers. Apart from water supply and sewerage, it is also responsible for waste collection, forestry and maintenance of sanitation in the city. Independent municipality offices perform similar tasks in various provinces.

The Ministry of Irrigation, which has been established recently, is in fact responsible for development of all surface and groundwater in the country under a 1981 law. Some other Ministries also execute water supply and sanitation functions on a small scale, eg the Ministry of Public Health.

Problems and constraints

Only 33% of urban and 11% of the rural population have reasonable access to safe drinking water. The majority of the remainder use dug wells, springs or water from irrigation ditches, most of which is unprotected and obviously polluted.

Only in the cities is microbiological control provided; particularly in Kabul, these controls are regularly carried out. The number of unsatisfactory microbiological tests has been reduced from 42.8% in 1981 to 20% in 1983. Nevertheless, in 1984, from 843 microbiological tests carried out, only 84.5% conformed to WHO international standards. Shortage of disinfectants also exists to some extent. A workshop on quality control was held in 1984.

Extensive construction work was carried out in 1984. More than 100 water wells were drilled and more than

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,890	136	385	N/A	N/A	14,380	1,100	N/A
(1985 Actual)					(1985)		
2,470	445	500	45	80	13,670	2,300	-
(1990 Targets)					(1990)		
3,199	992	800	47	139	12,800	4,100	-

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
75	60	2,000	413	20	15

Afghanistan (cont)

100,000 people were provided with access to safe water in rural areas.

The Afshar and Logar water supply projects, just completed, will increase the supply to Kabul to 87,000m³/d.

No comprehensive urban sewerage system has yet been developed in Afghanistan. There are only about 16km of collecting sewers in Kabul and immediate steps are required towards planning and providing a public sewerage system.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	134.30
Investment totals (US $ millions 81-85)	75.76

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.3	0.15	NO

Algeria

Currency: Dinar 4.7 = US$1.00
Population: 21.7M (50% urban)
Official language: Arabic
Population growth rate: 3.5% (1983)
GNP per capita: US$ 2,410
Life expectancy: 61 years
Infant mortality per 1,000 births: 81
Water diseases per 100,000: 250 (1980)
Adult literacy (M/F): 63/37
UNDP resident representative: Avenue Chahid El-Ouali 19, BP 823, El Djazair (Algiers) 16000

WATER AND SANITATION AGENCIES

Agence Nationale de l'Eau Potable & de l'Assainissement (ANEP), El Djazair (Algiers)

Ministère de l'Hydraulique, de l'Environnement & des Forêts Rue Tarik-Hocie Ben, Noamane, BP 34, Birmandreis, El Djazair (Algiers)

Ministère de la Santé 128 Chemin med Gassem, Closglembiers, El Djazair (Algiers)

Ministère des Finances Palais du Gouvernement, El Djazair (Algiers)
Telex: 52062

Ministère du Planification, El Djazair (Algiers)

With a land area of 2,381,741 km² (about a quarter the size of the USA), Algeria is the second largest country in Africa. Agriculture accounts for only 3.5% of the area, mostly the 1,000km long fertile Meditarranean coastal strip. South of the Atlas mountains, Algeria extends for 1,500km into the Sahara desert.

Level of supply

During the oil boom of the 1970s the cities of the north grew rapidly, and by 1980 about 50% of the population was urban. The capital, El Djazair (Algiers), passed the 3M mark in 1981.

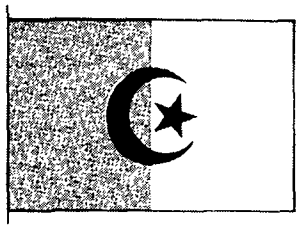
In 1980, it was reported that 90% of the urban population was connected to a private piped supply, with the remainder using standpipes. However, this statistic disguised the unreliability of supply, particularly between May and September. Figures for urban sanitation were sketchy, with about 95% having access to an unspecified sanitary facility.

New data on urban water and sanitation are not available, but major water supply and sewerage schemes are under construction (1987) with World Bank funding in El Djazair and Qacentina (Contantine), and a water transfer scheme for Wahran (Oran), the second port city after the capital. Other projects to alleviate water shortages in Biskra, Setif and Chelif areas, which suffered cholera outbreaks in 1986, are planned.

The level of provision of safe water and sanitary facilities in rural areas is not known (in 1980 both were reported as 70%) However, rural water supply is likely to benefit from the planned expansion of irrigated agriculture.

National Plan

Nearly 7.5% of development spending under the 1985-1989 Second Five Year Plan will go to water resources, compared with 2% previously Traditional investment in oil and gas was mostly completed under the old plan, and agriculture and water resources



developments are the primary objectives of the current plan. The aims are to reduce the import of two-thirds of the country's food, and halt the migration from the land to the cities.

The Plan, published in July 1984, envisaged the completion of 16 dams under construction with a combined capacity of 800M.m³ of water, and the start of 17 further dam schemes.

Irrigation work already started in the Habra region (10,000ha), at Ksob and Mina (13,000ha), and at West Mitidja, Guelma, Mehnia and Arib (35,000ha) will be completed. New schemes cover 42,000ha, bringing the total area under irrigation by 1989 to 420,000ha.

Future prospects

Two severe constraints on achieving water and sanitation objectives are addressed by the Plan: Insufficiency of trained personnel and inadequate cost recovery. Local expertise in research, engineering, construction and maintenance is being reinforced. It is policy to favour joint ventures instead of turnkey projects. World Bank assisted projects now usually incorporate a tariff reform component.

American Samoa

Currency: US Dollar
Population: 32,000 (63% urban) (1980)
Official language: English
Population growth rate: 2.5% (1980)
GNP per capita: US$2,060 (1980)
Life expectancy: N/A
Infant mortality per 1,000 births: 17.8 (1980)
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Environmental Quality Commission

Development Planning Office

Public Health Department

Public Works Department

An island of 195km^2 in the Western Pacific, American Samoa had in 1980 a population of 32,000 growing at the rate of 2.5% a year.

Water supply

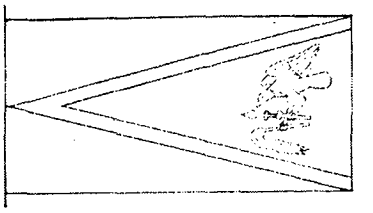
The whole urban population (63% of the total) has house connections, and piped water systems supply all the rural areas. However, water was untreated in 1980, and of unsatisfactory quality. The Environmental Quality Commission was stepping up a programme for water quality monitoring, using the Public Health Department's laboratory.

There were no plans to improve water quality by treatment, but rather to select the best sources and emphasise health education. The Office of Comprehensive Health Planning set the goals and strategy for the priority problems of infantile gastroenteritis and diarrhoea.

Sanitation

In 1980, about half the urban population was connected to public sewers, and half had access to some sort of sanitary disposal facility – pit privies, pour-flush latrines or septic tanks. About 87% of the rural population was estimated to have adequate sanitation.

No figures were available in 1980 for investment planned in the sanitation sector.



Administration and investment

EQC carries out overall planning in the sector in conjunction with the Development Planning Office. EQC also negotiates loans, monitors water quality, and designs urban sanitation.

The Public Works Department designs urban water supply schemes, and constructs, operates and maintains both water and sanitation projects in urban areas.

Rural water projects are carried out by the Public Health Department, DPO and local communities. Rural Sanitation is covered by DPO and Public Works.

Funding is provided by different US federal government agencies, from which details are not available.

Between 1981 and 1985 it was planned to invest $3.5M in urban water and $4.5M in rural water. Between 1986 and 1990 the budgets were scheduled to remain the same for urban water, but double for rural water.

No figures for planned investment in sanitation, if any, were given.

The cost of urban house connections in 1980 was $1,000 per capita. Sewerage connection cost $1,500 and household sanitation $100.

Angola

Currency: Kwanza 29.9 = US$1
Population: 8.57 million (23% urban)
Official language: Portuguese
Population growth rate: 2.4%
GNP per capita: US$560
Life expectancy: 41 years
Infant mortality per 1,000 births: 107
Water diseases per 100,000: 3607
Adult literacy (M/F): 49/NA

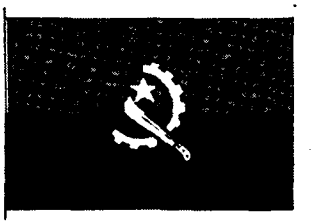
UNDP resident representative:
rue Major Kanhangulo 197,
CP 910 Luanda

The People's Republic of Angola has a land area of 1,246,000km^2 on the southwest coast of the African continent. A central plateau 1,000 to 1,300m above the coastal plain covers 66% of the country.

Mountain ranges on the southwest and northeast sides of the plain give rise to the major rivers Kwanza, Kunene, Kubango, and Keve, headwaters of the Zaire and Zambesi river systems. Rainfall varies from 50mm to 1,000mm a year.

Angola has one of the lowest population densities in Africa, and a community of 3,000 people is listed as urban. Administratively the country is divided into 18 provinces, 163 municipalities, and further into 365 communes.

Agriculture, which employed 75% of the population in 1980, has been defined as the basis for economic development, although industry was identified as the crucial sector for national reconstruction.



National planning

No Decade plan exists, but guidelines were laid down at the beginning of the Decade by the ruling party at a special Congress. For the rural population the plan was to have 20% supplied with safe water by 1985, double the 1980 proportion. In the event, only half as many people again now have safe water as they did in 1980, although the proportion served has gone up from 10% to 15% because the rural population has fallen slightly. About the same number also have some form of sanitary disposal system, usually septic tanks.

In the urban centres about 85% of the

Angola (cont)

WATER AND SANITATION AGENCIES

Ministry of Construction, Predio da Mutamba, Luanda

Ministry of Planning, Largo du Palacio, Luanda
Telex: 3082

Hidrominia (Ministry of Industry)
R Governador Eduardo Costa 25-10, Luanda

Telex: 3373

Directions Provinciales des Travaux Genie (DNOE)
Luanda.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	412
Investment totals (US $ millions 81-85)	107

population have safe water, a third of them from private house connections. This level of service has not changed since 1980, the increase in the number of standpipes and connections just keeping pace with population growth.

In 1980, it was reported that a few towns had sewers in the centre, but no treatment plants. It is presumed that none has been built since, because the number of townspeople with connection to a sewer or use of a septic tank has increased only marginally, at a rate less than population growth. This means that the level of service had actually fallen from 40% coverage in 1980 to 30% in 1985.

However, current planning envisages 48% of townspeople will have a sanitary facility by 1990, 30% by means of septic tanks and the rest by a doubling of the number of sewer connections. All town dwellers should have clean water by the same date, more than two-thirds from house connections.

In rural areas, it is planned to provide 30% of the population with safe water and sanitation by 1990.

Principal agencies

No information has been received that the administrative structure has changed since 1980, when the organisation was as follows:

The Ministry of Construction is responsible for new water and sanitation installations. Provincial directorates operate as executing agencies; those for Luanda and Benguela are ENCIB and ECIBEN.

The DNOE has a Groundwater Nucleus (NAS), and Hidromina is geared to groundwater development, mostly in the south and central areas. Geological maps exist, but there has been no systematic survey of resources - an obvious constraint on borehole programmes.

There is a National Directorate of Local Services (DNSL) for system maintenance, and a National Water & Sanitation Group (ENAS) operating in Luanda and two other towns.

A lack of qualified staff was cited as a severe constraint in 1980, with only three qualified engineers to degree level in the country. The Ministry of Construction has a school for training water technicians and pump mechanics. Although the training budget was deemed inadequate in 1985, there are now 209 technicians and 722 artisan craftsmen. No figures are available for the numbers of degree-qualified engineers, planners and managers.

Investment needs

Spending in the water sector between 1980 and 1985 was 107 million, 26% of the estimated cost of reaching the decade targets. This represented a considerable increase on the previous five years (1976-1980), when 3.7 million was spent, and only just fell short of the 114 million budgeted for. Only 11% has been funded externally.

The main constraints listed in 1980 were lack of trained staff, import restrictions, insufficient thrust in health education, inadequate administrative structure, and lack of community participation. However, the MCP's local services arm (DNSL) was only established in 1979, and no further information is available on its work since 1980, except that community participation at all stages, planning, building, and operation, is now running at 70%.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,200	360	660	240	240	6,700	670	1000
(1985 Actual)					(1985)		
1,972	394	1,320	256	315	6,601	978	1,056
(1990 Targets)					(1990)		
2,993	2,095	898	538	898	6,985	2,095	2,095

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
100	40	110	40	30	10

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
150	30	100	20

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.15	0.10	NO

Anguilla

Currency: East Caribbean Dollar 2.7 = US$1.00
Population: 7,000 (1983)
Official language: English

WATER AND SANITATION AGENCIES

Public Works Department

Public Health Department

One of the Lesser Antilles group, the island of Anguilla has a population of about 7,000. Rainfall varies between 600 and 1,650mm annually. Limited groundwater resources are exhausted in the dry season, and roof catchments and cisterns are the main source of water supply.

The following account is based on the government's report to a World Health Organisation/Caribbean Development Bank meeting in 1983.

Water supply

The public distribution system totals 50km, supplied from five pumped sources and serving 550 connections as well as standpipes. Wells are used in rural areas. Rain collection systems are common because of the unreliability of groundwater in dry years.

As a further back-up, the government planned a reverse-osmosis desalination plant to supply water tankers.

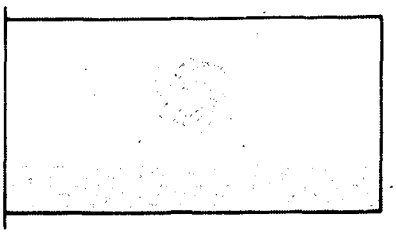
The Public Health Department, responsible for quality monitoring, and the water section in the Public Works Department have insufficient resources.

The government was reviewing the financing, organisation, staffing and training in the water sector.

Sanitation

There is no sewerage system. The population is scattered, and septic tanks are in widespread use. No major capital investment is proposed because solid disposal facilities are considered adequate.

Sanitation priorities include school facilities and control of waste discharges to protect groundwater sources.



Decade plans

Groundwater development is hampered by inadequate assessment of resources, which must be carefully managed to preserve quality. Although more boreholes are planned, desalination is seen as the best solution.

Overall planning suffers from the lack of an administrative framework and the difficulties of finance. The government complains that piecemeal funding makes sector planning impossible. Projects have to be developed in an ad hoc fashion to fit the constraints.

The British Development Division, based in Barbados, provides most funds. Some money has come from Canada, and the Caribbean Development Bank agreed a loan of $200,000 for water catchment improvement.

It is difficult to make projects self-financing, because the population is dispersed. Grants, instead of loans, are needed.

Argentina

Currency: Austral 1.5 = $1
Population: 30,500,000
Official language: Spanish
Population growth rate: 1.5%
GNP per capita: $1,929
Life expectancy: 70 years
Infant mortality per 1,000 births: 40
Water diseases per 100,000: N/A
Adult literacy (M/F): 96/95

UNDP resident representative: Casilla de Correo 2257,1000 Capital Federal, Buenos Aires

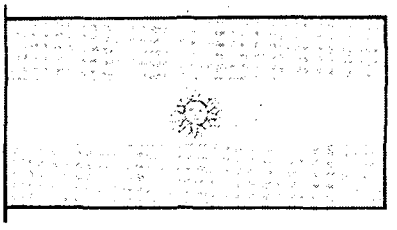
The Republic of Argentina is divided into four distinct physical zones: the Andes, the North and Mesopotamia, the Pampas and Patagonia.

Much of the land is arid or semi-arid with rainfall below 200mm/y and falling to below 50mm/y in some areas. Only 9% of the land area records precipitation in excess of 1,000mm/y. Surface water is distributed irregularly. It is estimated that 90% of precipitation disappears through infiltration, evaporation or evapotranspiration. The remaining 10% makes up surface water resources of 1,700km^3.

The Andes zone runs the entire length of the country and is low and dry in the south and mountainous and dry in the north.

The North and Mesopotamia includes the vast wooded plains of Chaco and the undulating land between the Parana and Uruguay rivers.

The centre of the country accommodates the Pampas zone, an area of vast plains or *llanos*, extending from the south of Chaco east of the Andes and north of the Colorado river. The eastern region is known as the Danys Pampa because it has more rainfall than the Dry Pampa in the West.



The fourth zone, Patagonia, south of the river Colorado, is a land of arid plains covering 780,000km^2.

Domestically, agriculture is less important than for other South American states, yet agricultural products provide most of the country's exports, including meat, wool, wheat, maize and cotton.

Since 1985, World Bank lending to Argentina, has focused on the improvement of water and supply services and for structural reforms in agriculture and improvements in public sector management.

In 1985, 61% of the urban population had drinking water supplied through house connections; 32% had sewer connections and 43% were connected by other means. In the rural areas, 35% of the population had access to sanitary facilities in the same year, but only 17% were provided with a water supply system. **Continued on page 18**

Argentina (cont)

WATER AND SANITATION AGENCIES

Direction Nacional De Delegaciones Sanitarias Federales,
(National Department of Federal Sanitary Delegations),
Secretaria de Salud Publica (Public Health Secretariat of State),
Defensa 120,
(1345) Buenos Aires
Telephone: 30 5923/30 5625

Empresa Orbas Sanitarias De La Nacion (Sanitary Works),
Subsecretaria de Recursos Hidricos, (Undersecretary for Hydric Resources),
M.T. de Alvear 1840,
(1122) Buenos Aires
Telephone: 41 1081/41 40111/41 4051
Telex: 21298 OSNBA

Servicio Nacional De Agua Potable Y Saneamiento Rural
(National Service for Potable Water and Rural Sanitation),
Libertad 836 - ler.piso,
(1012) Buenos Aires

Agua Y Energia Electrica (Water and Electric Energy)
Leandro N. Alem 1134
(1001) Buenos Aires
Telephone: 311 6364/311 3467/ 311 2006/7

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 23,112	14,146	831	7,390	13154	(1980) 4,750	786	1,531
(1985 Actual) 25,566	15,600	N/A	8,300	11000	(1985) 4,998	860	1,750
(1990 Targets) 27,744	22,195	—	19,421	N/A	(1990) 5,135	1,090	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
180	50	200	170	200	N/A

Continued from page 17

It is estimated that to achieve the 1986-90 Decade targets, $1,080M will have to be invested in urban water schemes and $1,560M on urban sanitation schemes. In the rural areas $36M will need to be invested to meet the Decade aims in terms of water supply schemes.

However, in September 1986, the Inter-American Development Bank approved two loans totalling $122M, part of which will finance the construction, expansion or improvement of potable water systems, sewage networks and storm sewers.

Again, in early 1987, the Bank approved an $80M loan to improve sewage collection and treatment and drinking water systems in the new federal capital planned near the twin cities of Viedma and Carmen de Patagones.

Principal constraints on the achievement of the Decade targets are the lack of a clearly defined administrative structure for Decade management, operation and maintenance problems and lack of community participation.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
350	180	450	160

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
1.50	0.12	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	150
Investment totals (US $ millions 81-85)	N/A

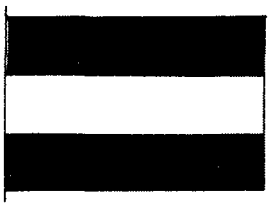
Austria

Currency: Schilling 12.88 = US$1.00
Population: 7.5 million
Official language: German
Population growth rate: N/A
GNP per capita: $9,120*
Life expectancy: 74 years*
Infant mortality per 1,000 births: 11**
*World Bank (1985)
**UNICEF (1985)

Accurate figures for 1985 are not yet available for water supply and sanitation in Austria, but the following are government estimates.

Approximately 98% of urban homes in Austria were connected to a public water supply system with the remainder connected to a private system such as wells or private reservoirs. In rural areas, the number of people connected to public supplies was only slightly lower, 90%, with the remainder relying on private supplies. Total water supplied in the country in 1985 was 420.7M.m^3.

On the sanitation side, around 85% of the urban population were provided with WCs connected to a sewerage system, while the remainder had WCs connected to a private sanitary system such as a septic tank. In rural areas, this division was roughly 50/50.



Roughly 10% of Austria's sewage is discharged without treatment, mostly into rivers, sometimes into lakes. Some 65% of wastewater is treated up to secondary level, while 25% receives only primary treatment.

WATER AND SANITATION AGENCIES

Bundesministerium für Wirtschaftliche Angelegenheiten (Federal Ministry for Economic Affairs), Stubenring 1, A-1010 Vienna
Telephone: +43 (1) 75000
Telex: 111145

Bundesministerium für Land- und Forstwirtschaft (Federal Ministry for Agriculture and Forestry), Stubenring 1, A-1010 Vienna
Telephone: +43 (1) 75000
Telex: 113260

Bundesministerium für Umwelt, Jugend und Familie (Federal Ministry for Environment, Youth and Family), Himmelpfortgasse 9, A-1010 Vienna
Telephone: +43 (1) 53330

Bahamas

Currency: Dollar 1 = US$1.00
Population: 250,000
Official language: English
Population growth rate: 1.9%
GNP per capita: $7,556
Life expectancy: N/A
Infant mortality per 1,000 births: 22.4
Water diseases per 100,000: 682
Adult literacy: 93

WATER AND SANITATION AGENCY

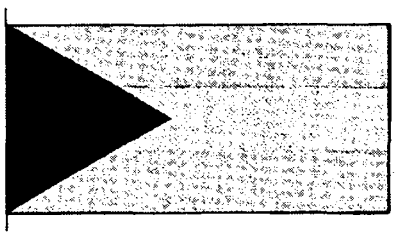
Ministry of Health, PO Box No. 3730, Nassau

An independent state within the British Commonwealth, the Bahamas consists of some 500 islands about 80km off the coast of Florida, USA, and covers a land area of 11,406km^2. The country has a subtropical climate and attracts a valuable tourist trade.

In 1985, 82% of urban dwellers had drinking water by house connection and 18% had standpost facilities. In terms of urban sanitation, 12% had sewer connections and 88% had other sanitation services.

Statistics for rural areas and those to support 1990 Decade targets are not available. However, in 1981, it was reported that about 70% of the rural population had access to an intermittent service with the rest depending on private wells.

The main sources of water are fresh water layers about 3m below ground level which are recharged by rainfall (about 1,350mm/year). Groundwater is brackish and hard. Public water supply systems are fed by 2,000 boreholes, 300 trenches, a desalination plant and barges from the island of Adros.



An increase in water demand, especially on the island of New Providence which receives over a million tourists a year, has led to over-pumping and a rapid rise in salinity. In many well fields pumping has had to be stopped.

Coordination between the agencies

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
250	136.4	227	91

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.37	1.10	YES

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(1985 Actual)					(1985)		
148	122.0	26.0	18.0	24.0	164.4	162.8	N/A
(1990 Targets)					(1990)		
89.4	88.1	0.89	22.3	N/A	166.1	165.3	N/A

Bahamas (cont)

concerned with the water sector has been limited and, as local manpower resources are scarce, the country has been obliged to depend on expatriate staff. There is a lack of qualified sub-professional staff, especially for operation and maintenance.

The following actions were recommended for the achievement of water sector development:

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	39.2
Investment totals (US $ millions 81-85)	19.9

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
350	260	1,232	365	N/A	N/A

- Preparation of a sector development plan;
- Formation of a groundwater resources management programme;
- Strengthening the Water and Sewerage Corporation and the Family Islands Water Supply Section;
- A manpower study of the sector needs to be undertaken and training programmes implemented;
- Revision and updating of existing legislation relating to water supply and sanitation.

In January 1987, it was reported that the European Investment Bank had approved a $9.52M loan towards improving water supply and sewerage systems on New Providence island.

Bahrain

Currency: Bahraini dinar 0.38 = US$1.00
Population: 425,000
Official languages: Arabic
Population growth rate: 3.2%
GNP per capita: $8,960
Life expectancy: 69 years*
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A
UNDP Resident Representative: Jufair, PO Box 26814, Manama, Bahrain
*World Bank (1985)

WATER AND SANITATION AGENCIES

Water Supply Directorate, Ministry of Works Power & Water, PO Box 326, Manama

Ministry of Health, PO Box 12, Manama

Water Resources Bureau, Ministry of Commerce & Agriculture, PO Box 251, Budayia

Public Works Directorate, PO Box 5, Bahrain

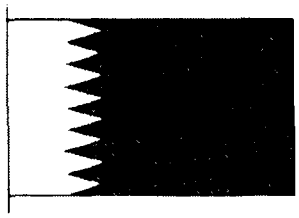
Thirty-three low-lying islands form the archipelago of the State of Bahrain, which is situated between Saudi Arabia and Qatar. The largest of these by far is Bahrain itself, which is connected by causeways to the Saudi mainland and to the islands of Muharraq, Sitra and Nibih Saleh.

The climate is hot and dry with relatively high humidity. Rainfall averages about 90mm a year, falling mainly in the winter and the coldest months are January and February, when mean temperatures fall to 17°C. Daily maximum humidities exceed 95% in winter months and there is a high evaporation rate during summer when temperatures are over 38°C.

Discovery of oil in Dukhan in 1932 made Bahrain the Gulf's first oil state and oil exploration brought demand for water which necessitated tapping the groundwater. In recent years, water consumption has risen considerably and varies between 350 and 480 litres. Increased use of groundwater had has an adverse effect on the quality of the water and on the piezometric head.

Total abstraction of groundwater for agriculture and domestic purposes was 168M.m^3 in 1983 and studies indicated that this should be reduced to about 90M.m^3/year to arrest deterioration in groundwater quality. Because of the need to conserve groundwater, Bahrain has drawn up a programme to develop alternative sources, mainly seawater desalination, and improve the water supply system to meet the demand to the year 2000. Work on this started before the Water Decade was launched.

In planning the water supply system, no distinction is made between the rural and urban population as development is contiguous and integral. The zonal division for design purposes is based on



geographical location and not on rural or urban status. Socio-economic improvement and improvement of services to the people of Bahrain is an integral part of national development plans.

Water-supply expenditure is met from government budgets which have a two-year cycle and plans for the sector are integrated with National Development Plans.

The planning cycle is four years, and it is expected that drinking water quality will improve and that supply will keep pace with increasing demand. The United Arab Emirates and the Kingdom of Saudi Arabia, both neighbouring countries, provide some assistance for source development.

The Water Supply Directorate of the Ministry of Works, Power & Water is the principal Government agency involved in the design, construction, operation and maintenance of water supply systems. Its policy is to construct desalination plants with sufficient capacity to keep up with demand, and to mix desalinated water with groundwater. Desalinated water is supplied from combined power/water plants (MSF) managed by the Electricity Directorate, which is also an arm of the Ministry of Works, Power & Water, and reverse-osmosis (RO) plants managed by the Water Supply Directorate.

The Ministry of Health is involved in overall surveillance of drinking water quality and the Ministry of Commerce

Bahrain (cont)

& Agriculture manages and monitors groundwater exploration and abstraction. At present, there is no Inter-Ministrial National Committee, but there is a National Committee for Conservation of Water.

The government has embarked on a metering programme and consumers are charged on a stepped tariff in order to reduce per capita consumption. There is a uniform monthly standing charge of B$1.5 for each household, which is presented with the electricity bill.

Sanitation

The entire population of Bahrain enjoys adequate excreta disposal facilities although the great majority of villages and towns are served by septic tanks and soakage pits.

Government agencies involved are the Central Municipal Council, Roads & Sewerage Directorate of the Ministry of Works, Power & Water and the Ministries of Health and Housing.

Construction of planned sewerage and sewage treatment started in 1977. Sewerage is now collected from Manama, Muhrraq, Greater Manama and Isa Town and pumped to a treatment plant at Tubli. Before 1977, sewerage was confined to Awali and Isa Town and sewage was discharged to the sea untreated.

Following completion of trunk sewerage in 1979, a masterplan for minor sewerage and house connections was prepared and an immediate start made to connect properties in Manama and Muharraq. By June 1985, about 104,000 people were being served by this system and proposals for using the treated effluent for irrigation were under consideration.

It is anticipated that sewerage systems will be available to all the inhabitants of Bahrain by 1995. In 1985 no charges were levied for excreta disposal and the main constraints on improvement of facilities were shortage of manpower and economic factors.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual)					(1985)		
339	339	0	106	233	86	86	86
(1990 Targets)					(1990)		
457	457	0	457	0	67	67	67

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
1,725	N/A	1,140	660	1,725	600

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
320	270	502	1

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	N/A	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,323
Investment totals (US $ millions 81-85)	741

Bangladesh

Currency: Taka 30.8 = US$1.00
Population: 100 million (18% urban)
Official language: Bengal
Population growth rate: 2.17%
GNP per capita: $136
Life expectancy: 54 years
Infant mortality per 1,000 births: 121
Water diseases per 100,000: N/A
Adult literacy (M/F): 43/22

UNDP resident representative: House No 60, Road No 11A, GPO Box 224, Dhaka 1000.

WATER AND SANITATION AGENCIES

Chief Engineer of Public Health, Ministry of Local Government & Rural Development, Bangladesh Secretariat, Dhaka.

Bangladesh Water Development Board, WAPDA Building, Motijheel C/A, Dhaka 2.

Ministry of Health, Secretariat Building, Dhaka.

Ministry of Works & Urban Development, Bangladesh Secretariat, Dhaka.

Dhaka Water & Sewerage Authority, WASA Bhaban, Kewran Bazer, Dhaka.

Chittagong Water & Sewerage Authority, Chittagong.

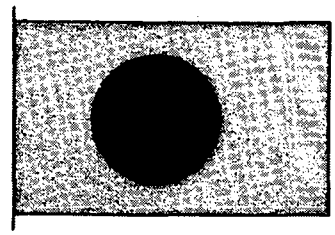
Much of Bangladesh's 144,000 km^2 area lies below 30m, which is why many parts of the country suffer perennial flooding. Three major rivers and a large amount of groundwater constitute the main water resources. Although groundwater is plentiful, it tends towards hardness or salinity in some areas and can contain large amounts of iron, manganese or fluoride.

Rainfall varies from about 1,250mm/year in the west to about 5,700mm in the south-east. Some 80% falls between June and September.

The country is divided into four administrative divisions, subdivided into 21 districts, 71 sub-divisions, 496 *thanas* and 4,334 unions. The urban population (18 million in 1985) lives in two cities - Dhaka, the capital, and Chittagong - and in 404 urban centres. The rural population (82 million) lives in more than 60,000 villages.

Though no figures are currently available, there is a high incidence of waterborne disease. In 1975, 30% of all deaths of children under 10 were caused by diarrhoea.

A National Action Committee responsible for implementation of the IDWSSD Decade was established in January 1979. An initial plan was completed in October 1980 as an integral part of the primary health care plan. A new plan was due in 1986.



In 1985, 56% of the population still lacked access to a safe water supply source, while a frightening 93% still had no adequate sanitation. In urban areas, however, the proportion of people with no safe water supply rises to 76% with a similar number lacking adequate sanitation.

Thus in water supply, the proportion covered in rural areas is higher than in the urban areas, reaching almost 50%, while for rural sanitation a mere 3% have adequate means of excreta disposal.

Current targets for 1990 are 30.5% for urban water supply (23.8% with house connections), 36% for urban sanitation (5.2% with sewer connections), 5.9% for rural water supply and 11.29% for rural sanitation. All these fall far short of the original targets declared in 1980 of 58% for urban water supply, 50% for urban sanitation, 77% for rural water supply and 13% for rural sanitation.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
10,000	-	2,000	-	- 2,000 -	80,000	31,000	1,000
(1985 Actual)					(1985)		
18,000	3,300	1,024	800	3,550	82,000	39,858	2,460
(1990 Targets)					(1990)		
25,000	5,950	1,920	1,300	7,700	88,000	51,970	9,933

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	81	15	2	5

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,157
Investment totals (US $ millions 81-85)	102.82

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
180	50	115	30

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.09	0.08	SOME AREAS

Barbados

Currency: Dollar 2.01 = US$1.00
Population: 253,000 (35% urban)
Official language: English
Population growth rate: 0.2%
GNP per capita: $4,889
Life expectancy: 72.7 years
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: N/A
Adult literacy: 99 (1983)

UNDP resident representative: PO Box 625C, Bridgetown

WATER AND SANITATION AGENCIES

Barbados Water Authority, Bridgetown

Ministry of Agriculture, Land and Water Use Unit, Bridgetown

The Caribbean Windward island of Barbados has a land area of 432km^2 with fertile soils and an economy based on intensive agriculture, particularly sugar.

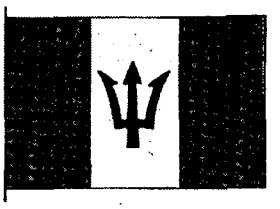
The Water Decade target for the island is 100% water supply coverage and 25% urban sewerage. No other sanitation targets have so far been notified.

By 1985, as the table shows, the country had achieved 98% urban coverage by house connection with the remaining 2% served by standposts. In rural areas, where 65% of the population live, 99% of the people had access to a safe water supply.

On the sanitation front, some 20% of the urban population have their homes connected to a sewer following the opening in 1983 of the island's first sewerage network in central Bridgetown. Another 27% of the urban population are able to use private systems such as septic tanks, but that still leaves more than half the urban population without any satisfactory form of sanitation.

No figures are available for rural sanitation, but this must be assumed to be considerably worse.

The Bridgetown sewerage system cost $42M and was based on a study financed under a technical cooperation agreement between the government



and the Inter-American Development Bank. A similar study is being undertaken into the feasibility of extending this system to serve the south and west coast as well as the Greater Bridgetown area.

The IDB has also been backing a rural development programme, initiated in 1979. The programme, for which the IDB loaned $4.1M, involved development of 30 agricultural units designed to benefit 1,500 farm families. All physical infrastructure works including irrigation systems, drinking water systems and feeder roads had been completed by 1985, or were near completion.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	12.93

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual)					(1985)		
89	87	2	18	24	164	163	N/A
(1990 Targets)					(1990)		
89	88	1	22	N/A	166	165	N/A

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
455	273	245	163

UNIT COSTS OF WATER PRODUCTION (US$/m^3)		
Average cost	Operation average water tariff	Progressive water tariff
0.34	0.68	NO

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
150	50	1,202	N/A	125	N/A

Belgium

Currency: Belgian Francs 38.00 = US$1
Population: 9,803,000
Official language: Walloon (French), Flemish (Dutch)
Population growth rate: 0.78%
GNP per capita: US$9,535.00
Life expectancy: 80 years
Infant mortality per 1,000 births: 10.13
Water diseases per 100,000: N/A
Adult literacy (M/F): 99%

WATER AND SANITATION AGENCIES

Ministère des Travaux Publics (Water & Sanitation)
Rue de la Loi 155,
B-1040 Bruxelles, Belgium.
Telephone: +32 (2) 734 91 07
Telex: 23381 OUMIN B

La Secrétaire d'Etat à la Santé Publique (Water and Sanitation)
Rue de la Loi 56,
B-1040 Bruxelles, Belgium.
Telephone: +32 (2) 230 01 70

Brussels Water Authority
Compagnie Intercommunale Bruxelloise des Eaux,
Rue aux Laines 70,
B-1000 Bruxelles, Belgium.
Telephone: +33 (2) 518 81 11

Institut d'Hygiène et d'Epidémiologie,
Rue Juliette Wytsman 14,
B-1150 Bruxelles, Belgium
Telex: 21034 IHEBRU B

In 1985, Belgium had a population of 9.8 million living in a land area of 30,513km^2. With an average density of 323 people per km^2, the distinction between urban and rural is somewhat arbitrary. This summary assumes urban to mean the five agglomerations of Brussels, Antwerp, Ghent, Liege and Charleroi.

Water supply

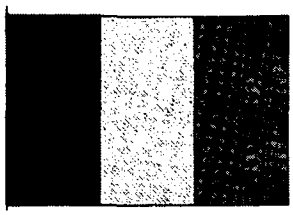
Responsibility for water supply rests with the municipalities, the lowest of the five administrative levels of federal administration. However, most of the muncipalities have set up "Intermunicipal Water Companies" which are responsible for specialised technical activities such as the supply and distribution of drinking water.

The National Waterworks was founded in 1913 to provide water supply in areas not covered by the municipalities, but was ultimately abolished at the end of 1984 to allow the Flemish and Walloon communities into which Belgium is divided to form their own water companies. Towards this end, the Flemish Water Supply Company has already been founded to supply areas formerly under the National Water Company in Flemish-speaking areas.

Total water production in 1984 was 751M.m^3. For domestic use in 1983, 105 l/d head was provided in rural areas and 195 l/d/h in urban areas. Almost all the 3.2 million urban dwellers and 6.4 million rural dwellers are supplied by house connections. The tariff charged in 1985 averaged US$0.34/m^3.

Water quality

More than 6,000 samples of water are analysed each year by the Institute of Hygiene & Epedemiology. In 1985, 94% of these samples were free of coliforms



and 99% contained less than 10mg/l of nitrates.

Whenever an accident or breakdown occurs at a treatment plant or in a section of the distribution system that would endanger the safety of the water supply, the undertaking is obliged to warn the State Secretary of the Department of Health and the consumers that the water supply is no longer possible.

At any time, the water undertakings can be obliged to pass analytical results concerning water quality to the services mentioned above. They must also inform the State Secretary of Public Health when new installations for storage and treatment of water for human consumption are put into service.

Although regionalisation in Belgium has transferred some powers from the national to the regional governments, such as management and exploitation of resources, the authority for technical regulation remains at the national level.

Sanitation

All of the urban population are served by a sewerage system and some 60% of the total population. Since 1980 management and exploitation of these systems has been the responsibility of the regions and municipalities.

At present, no data are available on investment and costs, partly because no inter-municipal sanitation undertakings have been set up, unlike the water supply situation. In rural areas, solutions other than sewerage systems are often adopted and seem satisfactory.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 3,448	3,148	—	3,448	—	(1980) 6,404	5,713	5,122
(1985 Actual) 3,402	3,182	—	3,402	—	(1985) 6,401	5,850	5,140
(1990 Targets) 3,358	3,358	—	3,358	—	(1990) 6,375	6,300	N/A

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	143,305

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Fixed water tariff*
	0.34	YES

*in some regions

Belize

Currency: Dollar 2 = US $1
Population: 161,500
Official language: English
Population growth rate: 3%
GNP per capita: $1,190*
Life expectancy: 66 years*
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: N/A
Adult literacy: 99%
*World Bank (1985)

WATER AND SANITATION AGENCIES

Water & Sewerage Authority,
44, Regent St,
Belize City.
Telephone: 027463/7079

Formerly known as British Honduras until 1973, Belize lies on the eastern coast of the Central American sub-continent, with the Yucatan Peninsula to the north and Guatemala to the west and south. Its land area covers 22,962km^2.

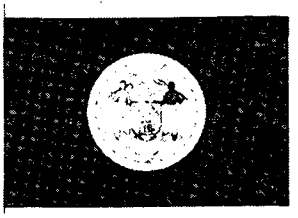
The country's principal exports include: sugar, citrus fruit, bananas, cattle, textiles and marine produce. Sugar production, which accounts for anything up to half of Belize's total foreign exchange earnings, fell in 1985 to 96,000t, a drop of 5% over the 1984 figure. Moreover, this 5% fall represented a 30% drop in export value.

Belize City, though no longer the country's capital, remains by far its largest commercial centre, as well as its biggest export. The city's population is 40,000. Belmopan, the new capital, is some 75km inland in the foothills of the Maya mountains.

Belize City suffers from a grave housing deficit of some 5,000 units: there is little prospect of alleviating the problem in the short term due, principally, to financial constraints.

River, spring and borehole water supplies feed distribution systems to the urban areas which are the responsibility of the Water and Sewerage Authority.

In 1985, it was estimated that 34.4% of the total population did not have safe



drinking water supplies and 15.4% were denied adequate sanitation. In the urban areas, 63,000 people or 73% of the urban population, had water supplies by house connection, while 27% had supplies by standpost. Only 7% of the urban dwellers had sanitation by sewer connection, but 64% had sanitation facilities by other means.

In the rural areas, 27% of the population had access to water supply and, according to official figures, the entire rural population of 76,000 had adequate sanitation.

The 1990 Decade targets include: providing 95% of the urban population with water supplies by house connection and 15% by standpost. Some 95% of urban dwellers should be serviced with adequate sanitation by sewer connection and 5% having access to such facilities by other means. Figures are not available for water rural supply and sanitation Decade targets.

Three independent organisations are responsible for on-going rural water supply programmes. The Ministry of Natural Resources has adopted a programme, primarily for livestock development and irrigation, but also provides potable water to small populations. Within the Ministry of Energy and Communications, the Water and Sewerage Authority has a programme of well-drilling and installing handpumps. The Public Health Inspectorate in the Ministry of Health, is running the rural water supply programme which is constructing individual drilled wells with handpumps.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(1985 Actual)					(1985)		
85.6	62.6	23.0	6.10	54.6	75.9	20.4	75.9
(1990 Targets)					(1990)		
98.5	93.6	4.93	88.6	9.8	79.2	N/A	N/A

Benin

Currency: CFA Franc 307 = US$1.00
Population: 3.83M (49% urban)
Official language: French
Population growth rate: 2.6%
GNP per capita: US$320
Life expectancy: 46 years
Infant mortality per 1,000 births: 106
Adult literacy (M/F): 37/16

UNDP resident representative: Lot III, Zone résidentielle, BP 506, Cotonou

WATER AND SANITATION AGENCIES

Ministère du Plan, de la Statistique & de l'Analyse Economique, Cotonou

Ministère des Travaux Publics, dé la Construction & de l'Habitat, Cotonou
Telex: 5282

Ministère de l'Industrie, des Mines & de l'Energie, Cotonou
Telex: 5252

Ministère des Finances, Cotonou
Telex: 5009

Direction du Genie Sanitaire & de l'Assainissement, Ministère de la Santé Publique, BP 882 Cotonou

Société Béninoise d'Eau & de l'Electricité (SBEE), BP 123 Cotonou

A West African country with a narrow coastal frontage on the bight from which it takes its name, Benin has a land area of 112,600km^2. Half the Beninois live in urban areas, which puts great pressure on the resources of the water and sanitation agencies.

However, 80% of town dwellers now have access to safe water, nearly half of them from public standposts, and 60% have some form of sanitation. There is no urban sewerage system, and unlikely to be by the end of the decade.

In 1980, only 26% of urban inhabitants had good water, and about half had access to a sanitary facility.

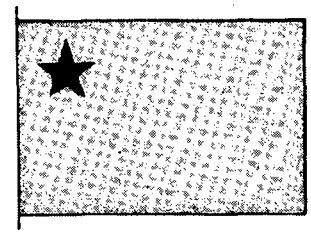
The rural population has remained stable in the first five years of the decade, and 34% now have a safe water supply, more than double the 300,000 people served in 1980. Just under 20% have adequate sanitation, compared with only 4% in 1980.

Agency responsibilities

General planning and loan negotiations are conducted by four ministries: Planning, Public Works, Industry, and Public Health.

All urban water supply, planning, building, construction supervision, operation and maintenance, comes under SBEE, while in rural areas the whole process similarly falls to a single agency, the Directorate of Hydraulics. Both SBEE and Hydraulics undertake groundwater exploration.

The Directorate of Hydraulics is responsible for rural sanitation, which in the towns is the full responsibility of the Ministry of Public Works. The Ministry of Public Health and SBEE are responsible for water quality.



About 420 trained staff work in the water and sanitation sectors at all levels from clerks to managers. There are no data on the numbers of unskilled workers employed. In 1980, it was estimated that 6,000 trained staff were needed. Current planning is to double the present numbers by the end of the decade, but the training budget is deemed inadequate.

Investment needs

By 1990 it is planned to supply all towns and 80% of rural areas with potable water. By then 80% of the urban population and half the rural population should also have adequate sanitation.

The costs of meeting these targets, which have been revised since the 1980 $202M plan, is not known. (In 1980, it was envisaged that 590,000 people would have connections to a piped sewerage system by 1990, but half of urban water supply would be from standposts).

Some information on up to date construction costs is available: a house connection now costs $88 per person compared with $100 in 1980. In 1980 it was estimated that urban standpipes cost $25, rural $20 per person, and non-sewered sanitation cost $50 per head in towns, and $5 in villages.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,580	165	248	0	760	1,960	300	80
(1985 Actual)					(1985)		
1,874	843	656	0	1,124	1,951	663	390
(1990 Targets)					(1990)		
2,118	1,271	847	0	1,694	2,204	1,763	1,102

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
40	10	60	20

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff

Pipe manufacture on-site

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Telex: 8 56 361 euro d

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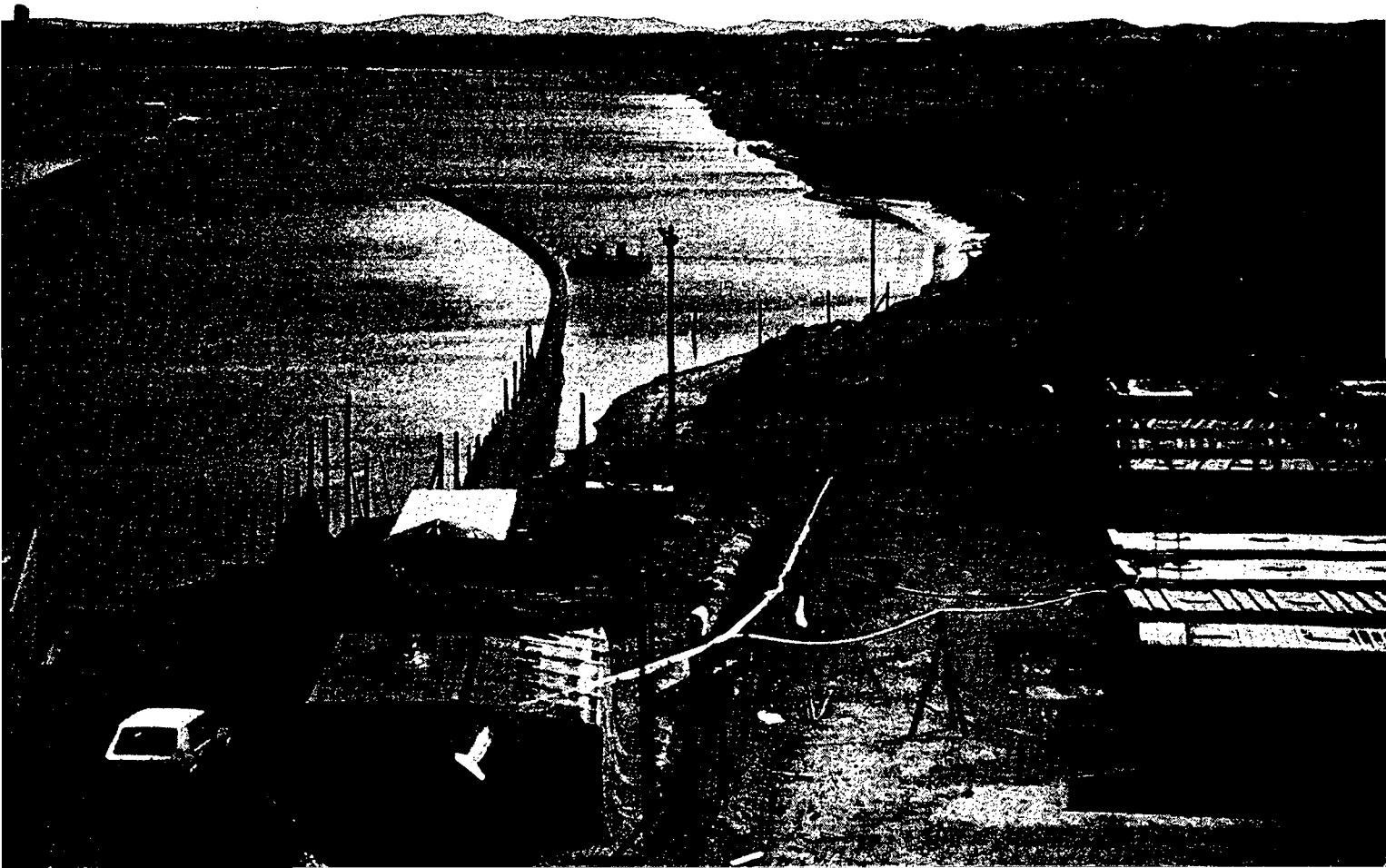

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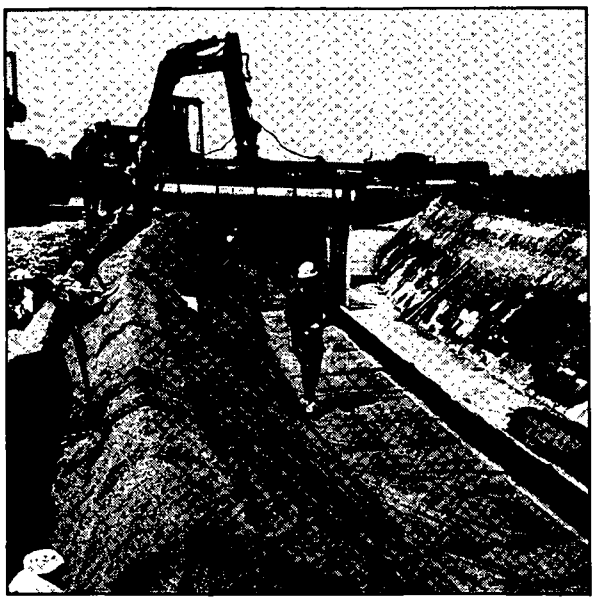

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Postbus 306, 6800 AH Arnhem - the Netherlands
Phone 085 - 66 45 93/ 66 31 03, Telex 45 204 enka nl.

Bhutan

Currency: Ngultrum 12.86 = US$1.00
Population: 1,286,000 (13% urban)
Official language: Dzongkha
Population growth rate: 1.7%
GNP per capita: $140*
Life expectancy: 46 years
Infant mortality per 1,000 birth: 102*
Water diseases per 100,000: N/A
Adult literacy: N/A

UNDP resident representative: Hydel Building, GPO Box 162, Thimphu.

*UNDP *Decade Watch*, March 1987

WATER AND SANITATION AGENCIES

Planning Commission, Thimphu

Public Health Engineering Cell, Public Works Department, Thimphu

National Urban Development Corporation, Thimpu

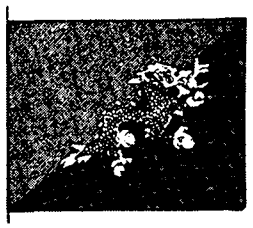
A small land-locked kingdom in the eastern Himalayas, Bhutan is extremely mountainous and covers an area of 47,000km^2. It rises from about 200m above sea-level in the south to 7,000m in the north.

The country is predominantly rural with only 13% of the population living in the 20 urban centres. Thirteen of these centres had piped supply systems at the start of the Decade, providing an intermittent supply to some 30,000 people. Only one system distributed treated water. In rural areas, simple gravity-fed systems supplied about 5% of the people. No urban or improved rural sanitation existed.

According to the UN Development Programme, an evaluation in 1984 revealed that over 80% of the water supply systems were malfunctioning or in disrepair due to lack of proper operation and maintenance. This has led to a switch of resources from construction of new systems, which had been proceeding quite quickly, to hygiene education and human resource development for operation and maintenance.

This has reduced the number of systems targeted for installation during the current Five Year Plan (1985-90) from over 1,000 to only 600. However, the Urban Water & Sanitation Project financed by the Asian Development Bank was scheduled to start implementation in August 1986 for completion by 1988. The project's aim was to rehabilitate existing piped systems in the six largest urban centres and upgrade existing structures and treatment works.

Central sewerage was deemed to be appropriate for the three main centres, Thimphu, Phuntsholing and Gaylephug. The sewage would be treated in waste stabilisation ponds. Less populated areas would be served by on-site disposal systems.



Bhutan has no end-Decade targets but has instead set targets for 1992. By this time, all the urban population of 193,000 would receive water by house connection and all the 1,287,000 rural population would have a safe source of supply. Sewers would be serving 100% of the urban population, while 772,000 rural people would have the use of adequate sanitation facilities.

Overall planning and financing of water and sanitation is the responsibility of the Planning Commission. Groundwater exploration and most rural water supply and sanitation functions are the responsibility of the Public Health Engineering Cell of the Public Works Department. A similar urban role is undertaken by the National Urban Development Corporation, a new body set up since the Decade started.

The country does have a water supply and sanitation service data collection and information system, although no routine water quality surveillance is yet undertaken.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
60	- 30 -		-	-	1,140	59	-
(1985 Actual)					(1985)		
168	N/A	N/A	N/A	N/A	1,118	217	N/A
(1990 Targets)					(1990)		
185	- 185 -		-	185 -	1,235	1,235	741

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
60	25	20	20	25	20

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
N/A	45	N/A	45

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	56
Investment totals (US $ millions 81-85)	4

Bolivia

Currency: Pesos Bolivianos 2.00 = US$1.00
Population: 6,400,000
Official language: Spanish
Population growth rate: 2.8%
GNP per capita: $470
Life expectancy: 53 years
Infant mortality per 1,000 births: 184
Water diseases per 100,000: N/A
Adult literacy (M/F): 84/65

UNDP resident representative: Casilla 686, La Paz

WATER AND SANITATION AGENCIES

Ministerio del Interior, Rene Gonzales, La Paz
Telex: ENT 5437 MIN BV

Corporacion Regional de Desarrollo de Tarija, PO Box 1369, Avnd. Las Americas, Tarija
Telex: 4444 CODETAR BV

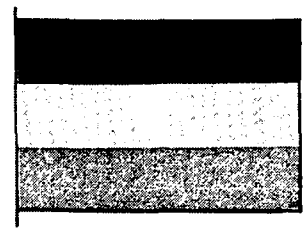
The Republic of Bolivia, the fifth largest country in South America, is a land-locked country bordered by Chile and Peru in the West, by Brazil to the North and East, and by Paraquay and Argentina in the South. Difficult terrain and extremes in climate cause transport, communication and economic difficulties.

Geographically, the country may be divided into three major regions: the Altiplano with 500mm of rainfall a year; the valleys with 950mm and the rainforest areas with 1,500mm. Climatic conditions vary extremely ranging from polar and tundra zones to tropical rainforests and desert. The lowest plains are 162m below sea level; the highest peaks, 6,400m above sea level.

Water resources are abundant but under-developed. They are distributed throughout three major river basins: on the Altiplano, Lake Titicaca - the highest lake in the world - and Lake Poopo are fed by small river systems while the rest of the northern rivers drain to the river Amazon and the rivers of the south to the river Plate. Groundwater is plentiful but full investigations have not yet been made.

Administratively, the country is divided into nine departments, with a capital nominally at Sucre, though actually at La Paz.

In 1985, some 57% of the total population did not have safe water supplies, and 79% had no access to sanitation. Some 44% of the urban population were supplied with water via house connections and 37% had standpost facilities. About 31% had sewer connections and 20% were covered by other means. In the rural areas, where 55% of the



population live, 27% of the population had water supplies; 22% had safe sanitation.

Decade targets include servicing 75% of the urban population with house connections for water supply, with 5% having access by standpost. About 35% of the population should be provided with sewer connections and 9% by other means. In the rural areas, the Decade aims to service 29% of the population with water supplies and 16% with adequate sanitary facilities.

In May 1984, the OPEC Fund for International Development approved a $2M loan to finance the Tarija Water Supply and Sewerage Project. The project aimed at serving 80% of the city's population with drinking water connections; 64% would have adequate sewerage services. The OPEC Fund has made one previous loan to Bolivia of $5M to finance an urban water supply and sewerage programme in the cities of La Paz and Cochabamba.

The Inter-American Development Bank in proposing a loan of US $14.4M to the Corporacion Regional de Desarrollo de Oruro (CORDEOR) for construction of Oruro water and sewage works. The project was under preliminary analysis in July 1987.

Botswana

Currency: Pula 1.7 = US$1
Population: 1.09M (21% urban)
Official language: English
Population growth rate: 3.7%
GNP per capita: US$840
Life expectancy: 56.3 years
Infant mortality per 1,000 births: 68.4
Water diseases per 100,000: N/A
Adult literacy (M/F): 73/69

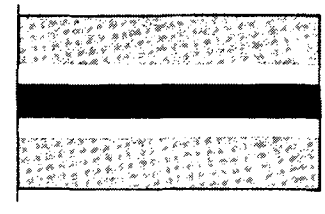
UNDP resident representative: Barclays Bank Building, PO Box 54, Gaborone

A landlocked middle-income developing country, Botswana has an area of 557,570km^2; a population of little more than one million (21% urban); but a population growth rate of 3.7%. About 75% of the population, and their substantial livestock holdings, are totally dependent on groundwater. Drought has severely hampered development over the last five years particularly for the large number of people dependent on cattle. Cattle numbers are believed to have reduced from three to two million because of drought.

Drought relief has therefore been a priority recently and 13 million Pula were allocated to water-related projects in the 1986-87 budget.

In 1985, 46% of the population was estimated to be without safe water, and 58% without access to adequate sanitation.

No Decade plan has been prepared but targets for urban water supply by 1990 are for 92%, 34% by house connec-



tion and 58% by public standpost. Main towns Gaborone, Lobatse, Fransistown, and Selebi Pikwe, were reported to already have 100% coverage in 1980.

Water supply

In 1985, 84% of the urban population of 227,000 people were estimated to have access to safe water, 33% or 76,000 people by house connection and 51% or 114,000 by public standpost. The urban population is expected to increase to 293,000 by 1990 and the government hopes to expand coverage to 94% of the population or 276,000 people. Targets

Botswana (continued)

WATER AND SANITATION AGENCIES

Department of Water Affairs, Private Bag 0029, Gaborone
Telephone: 52241/52245

Water Utilities Corporation, Gaborone

Ministry of Local Government & Lands & District Council, Gaborone

are for service by house connection to 105,000 people and by standpost for 171,000.

In the rural areas 46% of the population or 393,000 were estimated to have access to safe water. The rural population is expected to increase from 861,000 people to 1,014,000 but no specific target has been established.

Sanitation

About 93% of the urban population had adequate sanitation in 1985, 55% or 125,000 by sewer connection, and 38% or 86,000 by some other means. Targets for urban sanitation in 1990 have not been established. About 28% of the rural population or 245,000 people had access to adequate sanitation in rural areas. No specific targets have been set up to cope with the expected 1990 rural population of 1,014,000.

Costs

Unit costs of construction have been estimated as follows. For house connections, per capita costs are US$83, and for standpipe connections, per capita cost is US$44; both among the least costly in the region. Sewer connections are estimated to cost in the region of US$230 per capita with provision of other urban sanitation means averaging US$185. The cost of providing adequate rural sanitation has been estimated at US$40. Despite a steady programme of borehole provision and maintenance no figure is available for rural per capita costs.

No projections have been made for the cost of achieving Decade targets but water-related investment during the five years to 1985 was US$42.06M which was about 10.5% of total development expenditure. About 83% of this was funded by external sources.

Planning

The Department of Water Affairs was established to oversee construction and operation and maintenance of all major village schemes which set as a target, provision of 20-40 litres/day within walking distance of households. At the beginning of the Decade this programme had covered 28% of the population so there has been steady improvement through the Decade. However problems of drought and economic recession which Botswana has suffered along with much of sub-Saharan Africa have meant that progress on water supply has been slower than the government hoped.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual) 227	76	114	125	86	(1985) 861	393	245
(1990 Targets) 293	105	171	N/A	N/A	(1990) 1,014	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
83	44	230	185	N/A	40

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
N/A	30	N/A	30

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.75	0.54	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	39.31

Brazil

Currency: Cruzado 27.8 =$1.00
Population: 135,600,000
Official language: Portuguese
Population growth rate: 2.4%
GNP per capita: $1,640
Life expectancy: 65 years
Infant mortality per 1,000 births: 91
Water diseases per 100,000: N/A
Adult literacy (M/F): 79/76

UNDP resident representative: Caixa Postal 07-0285, 70001 Brasilia DF

WATER AND SANITATION AGENCIES

Ministereo de Saude
Esplanada dos Ministereo, Bloco 11, 5 and Floor, Sala 523B, Brasilia.
Telex: 611752

Ministereo de Interior
Esplanada dos Ministereo, Bloco 23, 7 and Floor, Sala 790, Brasilia.
Telex: 611015

Departamento Nacional de Obras de Saneamento,
Avenida Presidente Vargas 62, Rio de Janeiro, R J.

The Federative Republic of Brazil, which covers a total of 8,512,035km^2, is the fifth largest country in the world and the largest in Latin America.

It has a variety of climate, soils and vegetation: 40% of the total area is at an elevation of less than 200m. The river Amazon, which carries more water than any other river in the world, has a drainage area of 3,984,467km^2 - also the world's largest. The main Andean headstreams Huarco Ucayali and Maranon from Peru unite to flow across Brazil to the Atlantic Ocean, receiving the waters of many rivers, including those of the Madiera. The length of the Amazon is 6,448km.

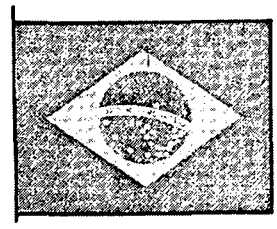
Administratively, the country is divided into 23 states, 4 federal territories and one federal district. Rapid urbanisation between 1970 and 1980 led to a 4.5% urban population growth.

Almost 78 million or 63% of the total population lives in urban areas. However, the population is highly concentrated in the major metropolitan areas, like Rio de Janiero and Sao Paulo, where 33 million people live.

National plan

The concern for basic sanitation in Brazil dates back to the 1960s when the country had a very poor range of services available: only 40% of the urban population was served with piped water supply in 1968, while sanitary sewerage systems catered for even fewer people.

Principal shortcomings included a lack of financial resources, lack of entrepreneural expertise in the municipal bodies and insufficient research in the field of sanitation.



These deficiences prompted the Brazilian government to devise effective measures for heralding a national plan of sanitation. In 1971, the Ministry of the Interior, in coordination with the National Housing Bank and the Pan American Health Organisation, launched PLANASA - the national sanitation plan.

PLANASA, which is a long-term plan with 5-year targets, aims at: Elimination of the deficit between supply and demand in sanitation services in urban areas; Attainment of financial self-support in the sanitation sector at state level; adjustment of water rates and sewerage rates to the users' paying capacity, to achieve a balance between revenue and overall costs; Institutional development of the state sanitation companies through training programmes; and Development of technical research in the field of basic sanitation.

PLANASA has made major progress: by 1980, the population served with piped water supply increased from 50% to 81%, covering 2,600 municipalities.

Decade progress

In 1985, 86% of the urban population was supplied with drinking water by house connection and 3% by standpost. Some 36% had sewer connections and 49% had sanitation by other means.

In the same year, in the rural areas, 71% of the population had water supply,

For the Water Decade 1980-1990, the Ministry of the Interior has set the following targets:

- 90% of the population to be provided with running water;
- 65% of the urban population to be provided with sewerage;
- 70% of all communities below 5,000 inhabitants to be provided with running water.

In Brazil, communities are not categorised as urban and rural for purposes of basic sanitation. However, small communities, those having less than 5,000 inhabitants) are specially catered for. Initially, PLANASA did not envisage such special arrangements and all communities were treated alike. A survey conducted in 1971 showed that nearly 80% of communities had less than 5,000 inhabitants. The total

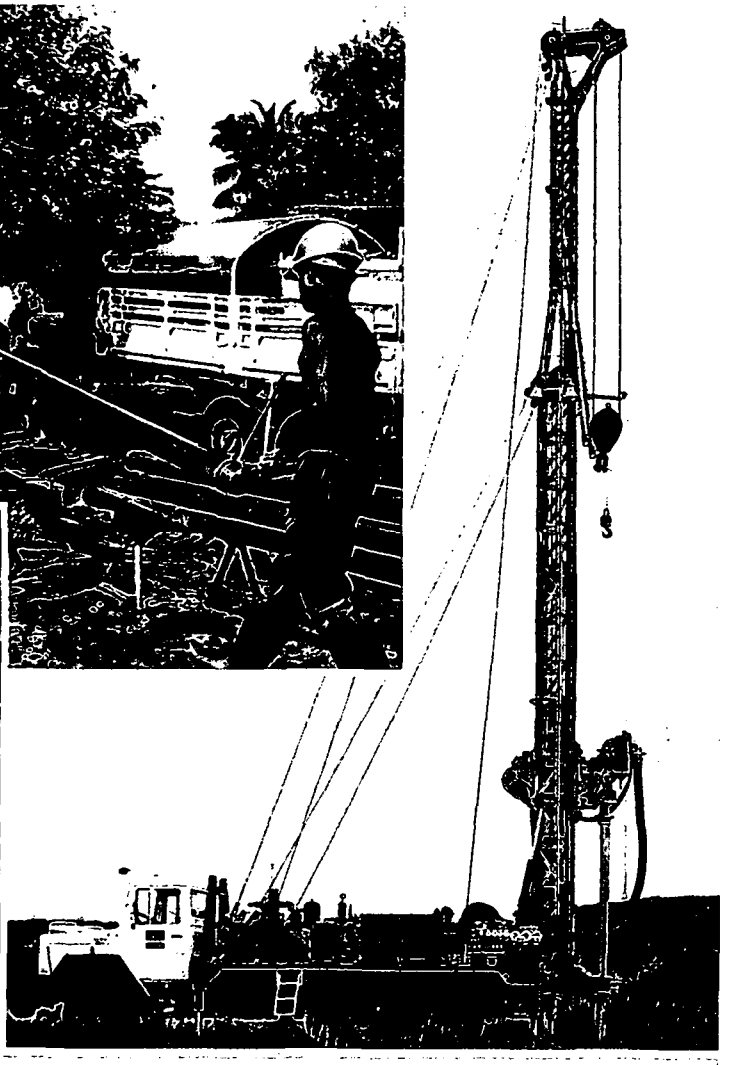
ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 80,470	64,600	N/A	25,900	N/A	(1980) 38,620	19,600	N/A
(1985 Actual) 97,399	79,900	2,909	32,100	N/A	(1985) 37,078	N/A	N/A
(1990 Targets) 116,566	104,909	N/A	75,768	N/A	(1990) 35,396	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
100	N/A	120	N/A	N/A	N/A

WATER



SERVICE PROGRAM

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D-3000 HANNOVER 51
PHONE: 5 11/64 20
TELEX: 9 22 419 + 9 22 847

FEDERAL REPUBLIC OF GERMANY

Brazil (continued)

number of such habitations is nearly 7,900.

In 1987, the Inter-American Development Bank approved a $163M loan for a programme to improve sanitary and environmental conditions in the Sao Paulo Metropolitan Area. The work will be undertaken by the Companhia de Saneamento Basico de Estado de São Paulo (SABESP). A further $77.5M was approved from the Bank to alleviate flooding and drainage problems and includes building drainage canals along the streams and rivers which drain the city.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
N/A	200	N/A	130

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
N/A	N/A	N/A

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	10.81
Investment totals (US $ millions 81-85)	3.37

British Virgin Islands

Currency: US Dollar
Population: 12,000 (1977)
Official language: English
Population growth rate: N/A
GNP per capita: US$ N/A
Life expectancy: N/A
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Water & Sewerage Department, Road Town
Medical & Health Department, Road Town
Building Authority, Road Town
Ministry of Communications & Works, Road Town

More than 60 islands with a total land area of 153km² in the East Caribbean make up the territory of the British Virgin Islands. Most of the population lives in Tortola island.

The following account is based on a government report presented at a joint World Health Organisation/Caribbean Development Bank meeting in June 1983.

Water supply

Only the capital, Road Town, had a public water supply system in 1983, serving about half the town through 600 house connections. The source is groundwater and treatment is limited to chlorination.

In June 1983, the 5th European Development Fund approved a $180,000 loan on special terms for the construction of four wells, a 900m³ reservoir and distribution pipework for East End, the second largest urban centre.

The public system is supplemented by private supplies from underground cisterns, which are also used for drinking water in preference to chlorinated piped supplies.

Public water supplies are metered, and different tariffs apply to domestic and commercial uses, ship supplies and retail sales.

Outside the towns, supplies are all untreated, from wells and cisterns.

Sanitation

Only a portion of Road Town is sewered. In 1983, according to government figures, 13% of households were connected to the system, 56% of the total population relied on septic tanks, and 18% had pit latrines. Rural sanitation was considered seriously inadequately in 1979.

Investment needs

The government's 1979 Public Sector Development Plan, which included providing 80% of the population with safe water by 1983, was seriously hindered by the difficulty of obtaining external finance.

The reasons given were the relatively high per capita income in the islands, and the lack of statistical data to prepare projects. No centrally organised planning body existed, and priorities were determined in an ad hoc fashion.

However, the government considered the population was healthy, and said that the Water Decade goal was 'not that far-fetched' for the British Virgin Islands.

Burkina Faso

Currency: CFA Franc 307 = US$1
Population: 7,014,000 (16% urban)
Official language: French
Population growth rate: 2.68%
GNP per capita: US$185
Life expectancy: 38 years
Infant mortality per 1,000 births: 167
Water diseases per 100,000: 5007
Adult literacy (M/F): 21/6
UNDP resident representatives: Place Naba-Kom, BP 575 Ouagadougou.

WATER AND SANITATION AGENCIES

Office National des Barrages et Aménagement Hydro-Agricole (ONBAH),
Ministère de l'Eau,
BP 7030 Ouagadougou.
Telephone: 33 48 25

Fonds de l'Eau et de l'Equipment Rural (FEER),
Ministère de l' Eau,
BP 7030 Ouagadougou
Telephone: 33 65 95

Ministère de la Santé Publique,
BP 7009 Ouagadougou.
Telephone: 33 20 39

Ministère de l'Agriculture et de L'Elevage (Aménagement des Vallées des Voltas),
BP 7005 Ouagadougou.
Telephone: 33 31 44

Office National de l'Eau et de l'Assainissement,
BP 170 Ouagadougou.
Telephone: 33 47 23; Telex: 5226

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
50-120	10-25	50-75	10-25

Formerly Upper Volta, Burkina Faso is a flat, land-locked West African country covering 274,122km^2. Its rainfall varies from 500mm to 1,400mm/year, and only the Black Volta and Caomoé are perennial rivers. Groundwater is therefore of paramount importance for the Burkinabê and their livestock.

The rural population accounts for 84% of the 7 million Burkinabê a percentage which is expected to change little by the end of the decade, when the population is expected to reach 7.6 million people.

Agriculture accounted for 95% of the country's exports in 1980 which employed 90% of the workforce. However, between 1980 and 1985, GNP per capita fell from $240 to $185. A victim of the Sahelian drought, Burkina Faso ins a recipient of international famine relief programme funds. Subsistence farming is estimated to take up 90% of the cultivated areas, almost 5M.ha.

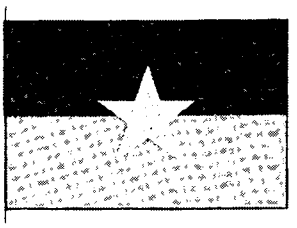
An internationally sponsored programme has been drawn up to encourage migration to the relatively fertile southwest. It includes a $120M UN project to eradicate onchocerciasis (river blindness).

An interim development plan operated from October 1984 to December 1985, when it was due to be replaced by a five year plan to the end of the decade. Emphasis is on small-scale projects which can be operated by village cooperatives.

The decade objectives were set in October 1980 at a national workshop in Ouagadougou, calling for 10 l/day by 1985 and 25 l/day in 1990 in rural areas. In urban areas, the goal was 120 l/day in the capital, Ouagadougou, and between 50 and 70 l/day in smaller centres.

In 1980, only 27% of the urban population had potable water, half of these from house connections, and 37% had latrines although there was no urban sewerage. About a third of the rural population had access to safe water, but only 5% had sanitary facilities, either private or public.

By 1985, 42% of townspeople had a safe supply, and 44% benefitted from better sanitation, although urban sewerage was still non-existent. The rural situation had improved much faster, with nearly 70% of villagers having access to safe water, and the proportion with access to a sanitary facility unchanged.



The plan for 1990 envisages no more rural water schemes, resulting in a reduction in service level corresponding to the natural increase in population. A major drive is planned in the sanitation sector, extending latrine facilities to 85% of the rural population by 1990.

No urban sewerage schemes are planned but a steady improvement is expected, extending safe disposal systems to 46% of town dwellers by 1990. All towns should have complete provision of safe water by 1990, about half from public standposts.

Water agencies were rationalised after the present government came to power, in August 1983, with the creation of a Ministry of Water which has a Department of Studies, Planning & Inspection, and the National Dam & Hydro-Agriculture Office (ONBAH). The Minister of Water is also President of the National Water Office, chiefly responsible for urban supply (ONEA).

The Voltas Valleys Authority, formerly in the Rural Development Ministry with ONBAH and ONEA, is now part of the Ministry of Agriculture & Livestock.

Other ministries concerned with water supply and sanitation are Public Health, Planning & Popular Development, Finance, Environment & Tourism, and Economic Development.

Staff shortages remain a critical constraint on the ministries' activities, with 259 personnel employed in the sector, of whom 88 have some technical training.

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
930	155	100	0	349	5,199	1,612	260
(1985 Actual)					(1985)		
1,093	230	235	0	482	5,921	4,060	350
(1990 Targets)					(1990)		
1,305	645	661	0	595	6,292	4,060	5,360

Burma

Currency: Kyat 6.65 = US$1.00
Population: 37,115,000 (24% urban)
Official language: Burmese
Population growth rate: 1.99%
GNP per capita: $188
Life expectancy: 62.6 years
Infant mortality per 1,000 births: 44.7
Water diseases per 100,000: 968
Adult literacy: N/A

UNDP resident representative: 24 Manaw-Hari Road, PO Box 650, Rangoon.

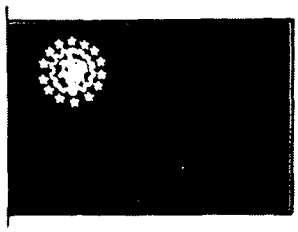
Covering an area of 677,000km^2, Burma has mountains in the north and west, an eastern plateau, a central basin and good coastal strips. Rainfall is about 5,000mm/year in coastal and mountainous areas decreasing to about 500-1,000mm/year in the dry zone.

Two major rivers, the Irrawaddy and the Salween flow from north to south. Nearly one person in every 100 suffers from a water-related disease.

At the start of the Decade, water supply coverage was 38% in urban areas and only 15% in rural areas. Sanitation service was available to about 38% of the urban population and 15% of rural dwellers.

By 1985, although the number of urban dwellers with water supply via house connection had increased by 138,000, the actual percentage of urban coverage had reduced to 36%, because the urban population increased by 608,000. It is not clear why the number of people with urban sanitation facilities has actually declined.

On the rural front, things are much better with a 9% increase in water supply coverage in five years, despite a 15% increase in the rural population. Almost 21% of the rural population now have adequate access to sanitation, a 6% increase.



Considerable strides will have to be made, however, if the rural coverage targets of 57% for water supply and 52% for sanitation are to be reached by the end of the Decade.

Urban water supply and sanitation is largely the responsibility of the Housing Department, though construction is undertaken by the Constructional Corporation. Rural community water supply is the responsibility of the Rural Water Supply Division of the Ministry of Agriculture & Forests. However, the Environmental Sanitation Division undertakes water supply and sanitation for rural health institutions and schools, and provides technical guidance to basic health staff on community water supply and sanitation.

WATER AND SANITATION AGENCIES

Water Supply & Sanitation Planning Division, Ministry of Construction, Rangoon.

Rural Water Supply Division, Ministry of Agriculture & Forests, 9/21 Strand Road, Rangoon.

Department of Health, Ministry of Health, 36 Thienbyu Road, Rangoon.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
65-70	30-35	62-65	12-30	4-27	4-12

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
90-135	45-70	70-110	30-45

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.25	0.2	SOME AREAS

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
8,300	1,581	1,573	266	2,888	24,600	3,690	3,690
(1985 Actual)					(1985)		
8,908	1,719	1,487	266	2,647	28,207	6,807	5,837
(1990 Targets)					(1990)		
9,907	- 5,430 -		- 4,418 -		31,013	17,619	16,045

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	512
Investment totals (US $ millions 81-85)	80.5

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Burundi

Currency: Burundi Franc 126.96 = US$1
Population: 4.8M (6% urban)
Official language: French, Kirundi
Population growth rate: 2.64%
GNP per capita: US$230
Life expectancy: 46.5 years
Infant mortality per 1000 births: 127
Water disease per 100,000: 20,000
Adult literacy (M/F): 43/26

UNDP resident representative:
3 Rue du Marché, BP 1490
Bujumbura

WATER AND SANITATION AGENCIES

Regideso, BP 660, Bujumbura, Telex BDI 96
Ministry of Planning, Bujumbura
National Water Commission, Bujumbura
Hygiene Service (Department of Epidemiology) Bujumbura
Department of Hydraulics & Rural Electrification, Bujumbura
Department of Sanitation, Bujumbura

At the northern end of Lake Tanganyika is Burundi, a least developed landlocked country covering a surface area of only 27,834km^2. With a 1985 population of 4,800,000 (94% rural) Burundi is one of the most densely populated of African countries. The country is bordered by Rwanda in the north, Zaire in the west, and Tanzania in the south and east. It is 2,000km to the nearest sea port (Dar-es-Salaam) and communications have in the past presented serious problems, with the country over-dependent on sometimes quarrelsome neighbours.

In 1985 the government estimated that 74% of the population were without access to safe water while 42% were without adequate sanitation.

Decade targets

Burundi's Decade plan was drawn up in 1984. Decade targets for 1990 in urban areas are for 96% of the urban population to be supplied with safe water and 100% to have adequate sanitation. Targets for rural water supply are 90% coverage and for rural sanitation 70% coverage.

Water supply

In 1985, 98% of the urban population or 304,000 people were estimated to have access to reasonable water supply, with 204,000 (66%) supplied by house connection and 100,000 (32%) by standpipe. This compares with 90% for 1980. The aim for 1990 is to keep pace with urban growth by increased use of standpipes. Plans are for 206,000 house connections and 137,000 urban dwellers served by standpipes, a total of 343,000 and still 98% of the projected 1990 urban population of 351,000.

In 1985 only 950,000 rural dwellers (21%) were reported to have access to safe water, not much advance over the 20% reported in 1980. Decade targets for this sector of the population are for provision of safe water to 90% (4,425,000) of the projected 1990 rural population of 4,918,000.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	42.32

Sanitation

Urban sanitation in 1985 was reported to reach 84% of the population or 260,000 people, while 56% of the rural population or 2,500,000 people were reported to have adequate sanitation. This is a marked improvement over the 1980 urban coverage figure of 40% and 35% rural coverage. Of urban dwellers 7%, 20,000 were connected to main sewers, the remainder 77% or 240,000 being served by some other means.

Plans for the Decade are to provide 100% urban coverage and at the same time increase the proportion of sewer connections. These will increase from 20,000 to 140,000 and use of alternative methods will be decreased. Total urban population served in 1990 will be 351,000.

Rural sanitation Decade targets are for an increase of almost a million in the population served bringing the total number to 3,442,000 by 1990. This will increase the percentage of rural dwellers with adequate sanitation from the 1985 level of 56% to 70%.

Planning

Burundi believes that it will require additional planning, managerial and technical personnel, along with artisan and clerical staff, to fulfil Decade objectives. A training budget has been established.

Per capita costs of household connections for water supply are reported

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
219	49	148	18	70	3,995	799	1,393
(1985 Actual)					(1985)		
310	204	100	20	240	4,472	950	2,500
(1990 Targets)					(1990)		
351	200	137	140	211	4,918	4,425	3,442

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
150	1,000	150	200	20	100

Burundi (continued)

as US$150 and for standpipes US$100 (this figure seems likely to be total installation costs of a standpipe rather than per capita costs). The per capita cost of sewer connections is reported to be US$150 while provision of alternative methods such as septic tanks averages US$200. Rural water supply per capita costs are US$20 and rural sanitation costs are reported to be US$100 per capita. Burundi does not operate a progressive water tariff.

There is no estimate of the investment required to reach Decade targets. During the five years to 1985, however, total investment in the sector amounted to US$42.32M which was 9.4% of total development investment for the country. Of this US$35M or 83% was funded by external finance.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
200	60	150	40

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.35	0.28	NO

Cameroon

Currency: CFA Franc 307 = US$1
Population: 10,000,000 (30% urban)
Official languages: French, English
Population growth rate: 2.6%
GNP per capita: US$800 (1984)
Life expectancy: 52 years
Infant mortality per 1,000 births: 99
Water diseases per 100,000: N/A
Adult literacy (M/F): 68/55
UNDP resident representative: BP 836 Yaoundé.

WATER AND SANITATION AGENCIES

Société National des Eaux de Cameroun (SNEC),
BP 157 Douala.
Telephone: +237 428711
Telex: 5265 AQUA

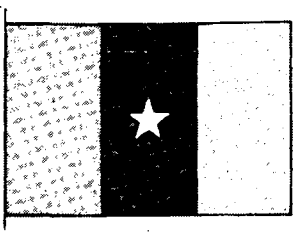
Ministry of Mines & Power,
Yaounde
Telephone: +237 233404
Telex: 8504 MINERGIE

Stretching from the Sahelian plains to the equatorial coast, Cameroon covers 475,000km² of widely varying terrain.

Except for the north, rainfall is abundant and reserves adequate. However, many urban centres are close to roads, not watercourses, and access to perennial rivers is difficult and costly.

Only broad figures for levels of service were available in 1980, which showed that a third of the urban and a fifth of the rural population had access to safe water. There was no public sewerage, and no information on the extent of private disposal systems.

By 1985, the first urban sewers served 100,000 people, a sewerage network which is planned to double in size by 1990. Very few rural villages had safe sanitary systems, covering less than 2% of the population. The 1990 target aims to reach the whole population, urban and rural, with sanitary disposal systems.



About 43% of urban dwellers now have safe water, three-quarters of them serviced by public standpipes. The situation in the countryside has changed little since 1980, but full provision for rural water supply is planned by 1990, compared with 70% coverage in the towns.

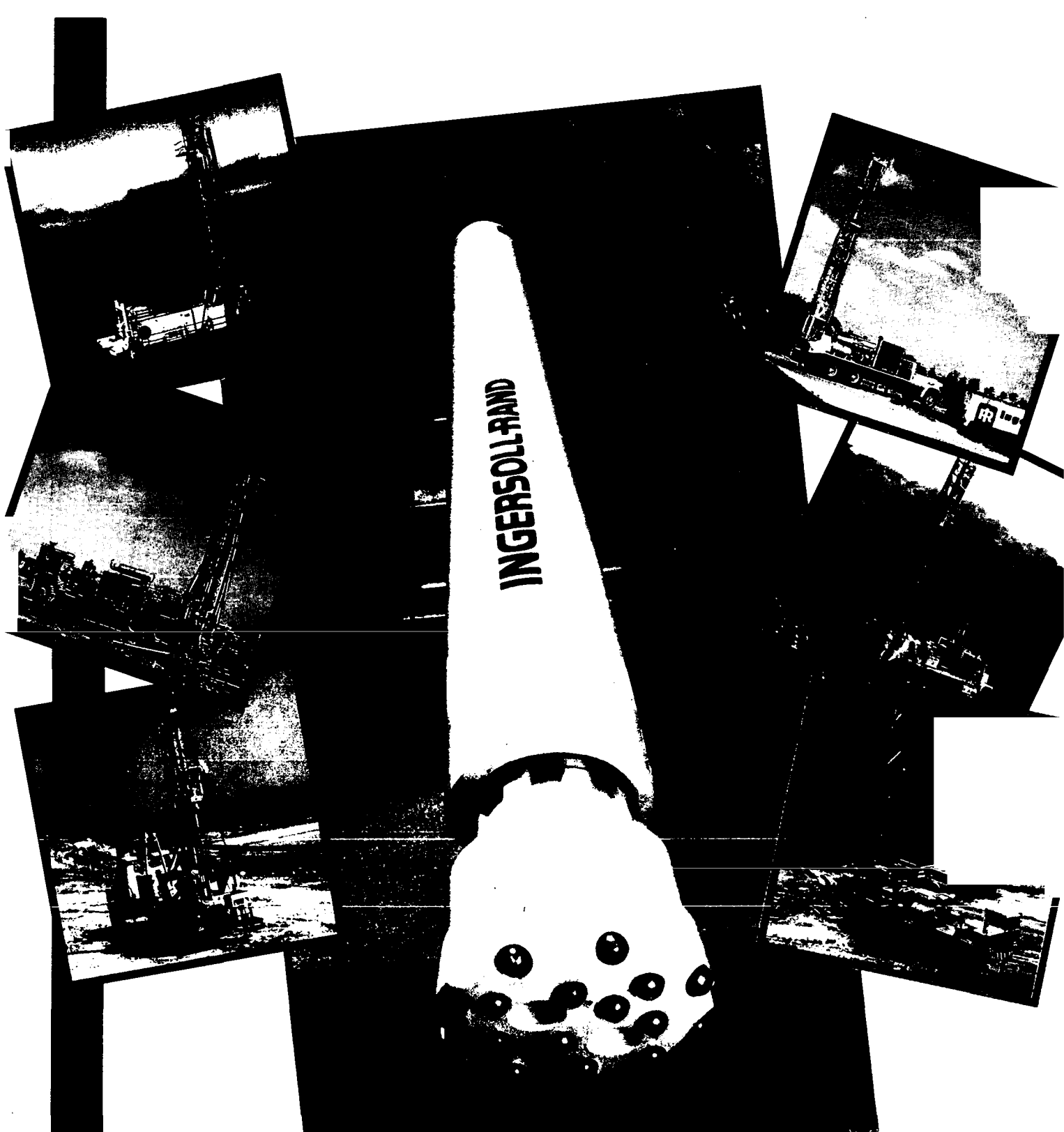
Considerable investment is required to achieve these ambitious targets, which were set at the beginning of the decade when planned investment was $1,000M. No figures are available for sector investment so far or how much needs to be spent to reach the target.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
150	150			80	

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
150	60	150	25

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
2.00	0.60	YES

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
(1985 Actual) 3,000	300	990	100	2,900	(1985) 7,000	1,680	100
(1990 Targets) 3,500	1,600	800	200	3,300	(1990) 8,000	8,000	8,000



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Cape Verde

Currency: Escudo 72 = US$1
Population: 337,000 (30% urban)
Official language: Portuguese
Population growth rate: 2.1%
GNP per capita: US$317
Life expectancy: 62 years
Infant mortality per 1,000 births: 66
Water diseases per 100,000: 5,070
Adult literacy: 50% (1980)

UNDP resident representative: Casa Moeda, CP 62 Praia

WATER AND SANITATION AGENCIES

Ministère du Developpement Rural, Praia

Ministère des Travaux Publics, Praia

The archipelago of Cape Verde comprises 10 islands, nine of them inhabited, lying off the Atlantic coast of Senegal, in West Africa. The islands rise to 2,800m, and deep enclosed valleys follow steep slopes to the sea. Rainfall fluctuates enormously, from 75mm to 1,000mm, and comes in torrential storms. Droughts can last for years.

Fast and irregular runoff means the islands suffer a chronic shortage of surface water resources.

Available resources

An estimated 40,000m^3/d of surface water is available, and 220,000m^3/d of groundwater, less than a third of which was being tapped in 1980. In 1985, all the urban population had access to safe water but less than half (43%) of the rural population. However, only 31% of town dwellers and 17% of rural inhabitants enjoy satisfactory sanitary conditions.

These levels of service are below the aims of the three-year development plan (1982-1985) which envisaged 55% of the urban population would be connected to sewers or septic tanks by 1985, and conditions in rural areas would be improved for 60% of the population. The infant mortality rate stands at 66% compared to 61% in 1980.

Improved sanitation for 60% of rural people and 55% of townspeople remains as the 1990 target. Maintaining full water supply service in towns is a 1990 objective and a groundwater project is underway to extend the rural service to 60% of the population. By 1982, 270 wells has been drilled on several islands by UNICEF and other donors, supported by UNDP and the UN Sudano-Sahelian office (UNSO).

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 108	25	83	12	25	(1980) 188	40	19
(1985 Actual) 135	33	79	18	25	(1985) 237	101	18
(1990 Targets) 130	90	40	72	—	(1990) 254	150	152

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
50	25	30	—

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
4.65	1.08	

Investment needed

In 1980 it was estimated that $34M was needed to meet Decade targets. No information is available on how much has been spent. The economy is almost completely dependent on outside assistance because of lack of natural resources and infrastructure. The main economic activity is agriculture, hampered by erratic rainfall and high winds. There is scarcely any industrial or energy development.

Lack of qualified personnel compounds the financial constraints, and there is no budget for training. Community participation was nonexistent in 1980, and no new information has been provided to challenge that assessment.

Cayman Is

Currency: Dollar 0.8 = US$1.00
Population: 21,300
Official language: English
Population growth rate: 4%
GNP per capita: $13,000
Life expectancy: 74.5 years
Infant mortality per 1,000 births: 10.9
Water diseases per 100,000: 1,841
Adult literacy (M/F): N/A

WATER SUPPLY AND SANITATION AGENCIES

Cayman Islands Water Authority, Tower Building, George Town, Grand Cayman,
Telephone: +1 (80994) 97999
Telex: 4260 CIGOVT

The Member for Development and National Resources, Government Administration Building, George Town, Grand Cayman,
Telephone: +1 (80994) 97900

The Cayman Islands are a group of three limestone islands located south of Cuba and northwest of Jamaica. The largest island, Grand Cayman, is 259km^2 of which 50% is mangrove swamp. The island's capital is Georgetown. The other two islands are Little Cayman and Cayman Brac.

The islands' population grew from 10,000 in 1970 to 17,000 in 1980. In the same period, the number of tourists grew from 23,000 a year to 181,000 a year. Indeed, the tourist industry dominates the economy and has a radical effect on water supply and sanitation development.

Economic growth, as a result of tourism, has taken place mainly in Georgetown and in the West Bay Beach area of Grand Cayman, without the advantages of any public piped water supply or any mains drainage system. Generally, individuals provide these facilities on a private on-site basis.

Water supply relies on on either rainwater catchment, groundwater or a combination of both. Sewage treatment is by individual septic tanks discharging directly into the ground on-site. The West Bay Beach area, which is the main resort location, is provided with a piped potable water supply from a privately owned seawater distillation plant.

Increased development of the island, especially in the Georgetown area, has placed a great burden on the limited groundwater resources, and the risk of bacterial contamination is high. In fact, public health data shows that 71% of wells sampled in Georgetown are contaminated by coliform bacteria; 47% of the rainwater cisterns in the area also contain coliform bacteria.

According to the Water Authority of the Cayman Islands, the national cost of providing individual facilities is high. Water costs, based on a average cistern size and catchment area is around US$100 per 4,500 litres, and the annual cost of operating a well is in the order of US$1,100. The annual cost of providing a household septic tank is about US$310. It is now common for householders and some hotels to regularly supplement their water supply by purchasing trucked water, operated by five companies.

The islands' Water and Sewerage Project office was established in December 1981, assisted by the United Nations Small Islands Water Resources and Management Project based in Barbados. The office, in conjunction with the UN Project acted according to the government's declared water policy: "Water, being a national resource must be preserved in keeping with the public good. All water is therefore subject to regulation, protection and planning and conservation, under provision of Law and may only be withdrawn, used, treated or otherwise affected as provided by Law".

To this end, the Water Authority Law was embodied in December 1982. It provided for the establishment of a Water Authority, having all the powers to protect water resources, control associated activities and to provide a public water supply and drainage facilities. Groundwater is in the public domain.

In 1985, 4,000 people, or 20% of the population had water supply by house connection, while 78% of the population, or 17,000 dwellers had supplies by standpost. There were no sewer connections, but 96% had sanitation facilities by other means.

For the Decade, targets adopted include supplying 50% of the population with potable water by house connection and 50% by standpost by 1990. The total population should have access to adequate sanitation by means other than sewer connections.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 17.0	N/A	N/A	N/A	15.9	(1980) Total population		
(1985 Actual) 21.3	4.3	16.5	0.0	20.4	(1985) classified		
(1990 Targets) 25.0	12.5	12.5	0.0	25.0	(1990) as urban		

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
400	N/A	2,500	N/A	N/A	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
220	N/A	200	N/A

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
2.75	3.3	N/A

Central African Republic

Currency: CFA franc 307 = US$1.00
Population: 2.67M (34% urban)
Official language: French
Population growth rate: 2.5%
GNP per capita: US$260
Life expectancy: 48 years
Infant mortality per 1,000 births: 190
Water diseases per 100,000: 452
Adult literacy (M/F): 53/29

UNDP resident representative: Avenue de l'Indépendance, BP 872 Bangui.

WATER AND SANITATION AGENCIES

Ministère du Développement Rural, BP 786, Bangui
Telephone: 61 28 00
Telex: 5217 (public)

Secretariat d'Etat à l'Hydraulique, BP 1481, Bangui
Telephone: 61 21 37
Telex: 5243 RC

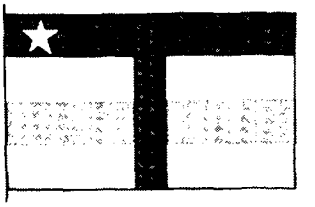
Ministère de la Santé Publique et des Affaires Sociales, BP 883, Bangui
Telephone: 61 29 01
Telex: 5217 (public)

Commité National de l'Eau et de l'Assainissement, BP 696, Bangui
Telephone: 61 29 18
Telex: 5217 (public)

Little known and land-locked, the Central African Republic is one of the world's least developed countries. The majority (66%) of its 2.7 million people live in rural areas, and in 1983 more than 90% of these had no access to safe drinking water.

At that time, it was estimated that 80,000 people were infected with internal parasites due to impure water. Another 30,000 contracted schistosomiasis every year while malaria, typhoid and onchocerciasis were also rampant.

Also in 1983, the International Development Association and other international and bilateral funding agencies financed a $51.2M rural development project aimed primarily at food production, but which also included hydraulic works to make drinking water available to large sections of the population, to improve public health greatly and encourage people to stay on the land. The project was the responsibility of the Agricultural Development Corporation (SOCADA) under the Ministry of Agriculture & Animal Husbandry.



Decade targets

By 1990, the government said it would install water points in all the prefectures, sub-prefectures and villages of more than 2,000 people. This would mean a total of 6,300 water points just to provide a minimum of 30 litres/d to 3,000 villages.

Achievement of this target would take at least until the end of the Decade and need considerably more investment. With only six engineers and 20 manual workers responsible for water in all rural areas, manpower was another severe constraint.

Nevertheless, with United Nations help, the government legislated in September 1982 for a National Action Committee for water which was to bring together the key ministries in the sector: Agriculture, Health, Planning and the Societé National des Eaux. It also received aid from the Water & Sanitation for Health (WASH) Project set up by the US Agency for International Development (USAID).

Despite this, the 1985 statistics show that only 13% of the urban population have any sort of safe water supply and sewerage systems are still non-existant in the republic. No up-to-date statistics are available for coverage in rural areas.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)	N/A	N/A	-	N/A	(1980)	N/A	N/A
(1985 Actual) 908	61	58	-	N/A	(1985) 1,765	N/A	N/A
(1990 Targets) 962	962	0	962	0	(1990) 1,870	935	935

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
183	6.6	N/A	N/A	N/A	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
49	25	45	N/A

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.41	N/A

Chad

Currency: CFA franc 307 = US$1.00
Population: 5M
Official language: Arabic, French
Population growth rate: N/A
GNP per capita: US$130
Life expectancy: 45 years
Infant mortality per 1,000 births: 138
Water diseases per 100,000: N/A
Adult literacy (M/F): 40/11
UNDP resident representative: Avenue Colonel d'Ornano, BP 906, N'Djamena

WATER AND SANITATION AGENCIES

Ministère de l'Elevage & de l'Hydraulique Pastorale, N'Djamena
Telephone: 21-02

Ministère délégué à la Présidence de la République chargé du Plan, N'Djamena
Telephone: 20-80 and 31-47

Ministère de la Sécurité Alimentaire & des Populations Sinistrées, N'Djamena
Telephone: 24-09

Ministère de la Santé Publique, N'Djamena
Telephone: 35-22 and 37-80

Ministère des Travaux Publics, de l'Habitat & de l' Urbanisme, N'Djamena
Telephone: 20-96 and 39-35

Ministère de l'Agriculture, Direction des Ressources en Eau, N'Djamena
Telephone: 30-81 and 30-43

Office National de l'Hydraulique Pastorale & Villageoise (ONHPV), N'Djamena
Telephone: 23-10

A vast landlocked country covering 1,282,000km^2, Chad is two-thirds desert. However, two great perennial rivers, the Chari and the Logone, flowing into lake Chad, give the country more agricultural potential than other Sahel countries.

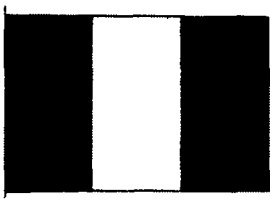
The most significant impediment to development is infrastructural. There are no metalled roads, only 700km of unrepaired dirt roads and 20,000km of tracks.

Also, because of the fighting which took place in the south between 1979 and 1982, and the occupation of the north by Libya, almost nothing was achieved in these years. Banking and the civil service virtually ceased to operate.

Since the Habré government took over in June 1982, the civil service has been revived, but the war with Libya continues. The following account is based on the 1980 Directory entry, but it is likely that little has changed.

Water supply

The level of service is about 30%, urban and rural. Some water supply networks exist in the towns; in villages sources are almost always traditional wells or cement wells. The last inventory in 1977 listed 2,000 permanent wells of which 20% were abandoned, and 4,000 traditional wells. However, there is an enormous number of villages and hamlets. Wells, which must be between 20 and 80m deep, cost about $300/m to construct.



Sanitation

Sewerage networks do not exist. Most wastewater goes to septic tanks and ditch latrines in the towns - a source of faecal pollution of shallow groundwater used for water supply. Waterborne and parasitic diseases are prevalent in urban centres.

Sanitation in villages is non-existant, although the government intends to promote rural health education.

Investment needs

In 1980 it was estimated that $3.5M needed to be spent every year until the end of the decade on urban water supply alone. In the uncertain political and economic climate, Chad has had enormous difficulty raising finance to develop the water sector.

The European Economic Community has been a significant lender, mostly to the cotton industry which employs half the population. Saudi Arabia recently lent $8.9M for a rural wells project, and France has given $1.6M to N'Djamena's water and electricity companies.

Chile

Currency: Peso 213 = $1.00
Population: 12.1 million
Official language: Spanish
Population growth rate: 1.7%
GNP per capita: $1,430
Life expectancy: 70 years
Infant mortality per 1,000 births: 26
Water diseases per 100,000: 185
Adult literacy (M/F): 97/96

UNDP resident representative: Casilla 197-D, Santiago

WATER AND SANITATION AGENCIES

Direccion General de Aguas, Morande 59, piso 8, Santiago.

Ministerio de Obras Publicas, Santiago.

Servicio Nacional de Obras Sanitarias, Morande 59, piso 5, Santiago.

On the South American continent, Chile is bounded by Peru in the north, in the east by Bolivia and Argentina, in the south by Antarctica and in the west by the Pacific Ocean. The country's total land area covers 741,763km^2.

Some 83% of the population is concentrated in urban areas, with 17% living in rural communities. Over 30% of the population is under 14 years of age.

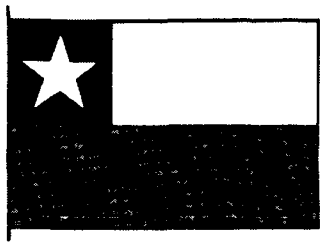
Economically, an export diversification programme has helped to reduce Chile's dependence on income from copper exports, from 80% in 1973 to 48% in 1983.

There are some 9,800km of rail network, while the road network covers 79,500km. Major ports include: Valparaiso, San Antonio, Coquimbo and Autofagasta.

In 1985, 13.5% of the total population lacked safe water, while 15.6% lacked safe sanitation. However, aims of the Decade include the provision of urban house connections to 100% of the population, with 82% having access to sewer connections; access to water supply is aimed at 85% of the rural population.

Current Projects

In September 1985, the Inter-American Bank approved two loans to Chile totalling $17M to help build and expand potable water systems in 240 rural communities. The programme, which will



benefit an estimated 114,000 residents of communities ranging in size from 100 to 3,000 inhabitants, will also help reduce the incidence of water-borne diseases in rural Chile.

The loans will be used by the Servicio Nacional de Obras Sanitarias (SENDOS), through its Department of National Programmes (DEPRONA), to carry out the following works:

- Construction of 190 systems required to provide drinking water to 240 rural communities, as well as the preparation of various water studies and the aquisition and installation of 14,500 meters and 300 production meters;
- Establishment of promotional campaigns to encourage residents to participate in the operation and maintenance of the water system;
- Rehabilitation and improvement of 130 rural water systems built in previous stages in an effort to extend their service life from 8 to 10 years.

In December 1986, the Bank approved a further loan amounting to $40.5M to improve sanitary conditions for low-income families in communities of more than 3,000 inhabitants.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
200	100	180	60

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.12	0.08	YES

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
9,071	8,420	651	6,251	2,764	1,900	355	N/A
(1985 Actual)					(1985)		
10,190	9,541	412	7,619	2,571	1,982	577	85
(1990 Targets)					(1990)		
11,230	11,230	0	9,208		N/A	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
165	N/A	150	40	N/A	N/A

China

Currency: Renminbi Yuan 3.722 = US$1.00
Population: 1,034,750,000
Official language: Putonghua
Population growth rate: 1.08%
GNP per capita: US$310*
Life expectancy: 67.90 years
Infant mortality per 1,000 births: 13.95 - 25.11**
Water diseases per 100,000: 401.75
Adult literacy (M/F): 82/56
UNDP resident representative: 2 Dongijie Sanlitun, Beijing

*From UNICEF report 1985
**Ranges of values for different provinces.

WATER AND SANITATION AGENCIES

Ministry of Water Conservancy & Electric Power, PO Box 2905, Beijing

The People's Republic of China has a population of over 1,000 million, 80% of which are rural inhabitants, and a land area of 9.6M.km^2. Of the total land area 33% is mountainous terrain, 26% is highlands, 19% is basin, 12% is flatlands and 10% is hilly land. Administratively the country is divided into 30 provinces which contain between 60 and 70 counties on average. Under each county there are many villages and towns.

Average annual rainfall is 400-900mm in the northern part of the country and 1,000mm-2,000mm in the southern part. The freshwater resources are rather poor being only about 25% of the world average.

In the old China, there was no water supply system in rural areas. Since the establishment of the People's Republic of China, there have been major gains in health, housing, agricultural productivity, rural water supply and economic conditions. Still, however, 40% of the rural population (approximately 300 million people) have problems with water supplies including high fluoride content, saline or alkaline water and those who only have access to untreated or contaminated water or live in water-scarce areas.

Urban and rural water supply in China comes under two separate sectors. For both, local initiatives and finance are the prime movers for development. In urban areas, the municipal governments are largely responsible for financing, designing and building water systems. In rural areas, about 90% of the funding for water systems comes from individuals and collectives, and are mainly constructed by the villagers themselves.

Most water works in rural areas are owned, operated and managed by the villagers and in some areas, jointly owned water companies serving several villages at the same time, have been established under the guidance of townships or counties. Rural water still presents a major problem, though.

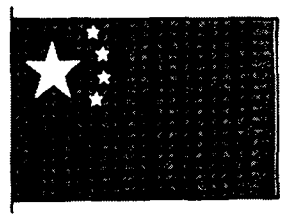
On the basis of past experience in water supply improvement in China the State Council of China decided to use the soft loans of the World Bank as one financial source for improving rural water supply systems and to set a programme for rural water supply improvement from 1983 to 1990. The programme consists of three stages: from 1983 to 1985 for 60 million people; from 1986 to 1987, for 100 million people; and from 1988 to 1990 for 150 million people. Thus, by 1990, 80% of the population should have access to safe drinking water.

The Central Patriotic Health Campaign Committee (CPHCC) was established by the State Council in 1981 as the agency responsible for organising Decade activities. The CPHCC consists of senior officials from some 30 ministries and agencies, and its objectives are the promotion of health and disease prevention through education and organised mass participation in health and environmental activities. The structure of the Committee is mirrored at local level (that is at provincial, county and township levels) and the local committees implement the policies and objectives of the Central Committee.

The national rural water supply programme initiated in 1981 and some physical works have been implemented at local levels. The programme has concentrated on information dissemination, training and subproject Office (NPO), with the technical assistance of the UNDP, WHO, the German government and the International Development Association.

The project areas financed by the World Bank loans include some 4,650 villages of 25 counties in 5 provinces: 6 million people will benefit from the project. National, provincial and county project offices have been set up and are to serve as models for water supply improvement offices in non-project provinces and counties.

Rural water supply improvements in the non-project areas are advancing at a



similar rate to the aforementioned project, but with traditionally arranged funding.

The size and autonomy of the provinces accommodate rural water supply and sanitation sector planning rather than a central body fulfilling the same role. A Rural Water Supply and Sanitation Technical Advisory Centre (TAC) has been established which will, with the help of the NPO and under IDA guidance, assist the provinces in analysing institutions and financial arrangements and developing plans for the sector.

Responsibility for rural water supply development has been centred mainly on the town and village which lack administrative, financial and technical skills: more technicians for planning, construction operation and maintenance are urgently required to meet the needs of the waterworks. Assistance in these areas is sometimes provided by the county or the province and CHPCC provides technical assistance nationwide at different levels.

To facilitate easier and more controlled planning and design quality of projects, a manual was produced in 1984 under the direction of the CHPCC with IDA assistance. The manual can be and is used for training purposes.

About 70% of the population is served by a piped water system; the remainder are served by handpumps and rainwater collection systems. The systems are designed for a 15-year horizon, 45-80 l/d per capita for house connections and 20-40 l/d per capita for public standpipes.

Water quality is controlled first at the waterworks level with subsequent monitoring and control by the township or county. Townships and counties are also the repositories of materials and parts, thereby simplifying and reducing the cost of maintaining inventories. The cost of services provided is partly recovered through charges to the villages.

A system of monitoring project progress, reporting, review and attacking of corrective action has been set up to facilitate successful implementation of the project, and the NPO will prepare progress reports for the IDA semi-annually. Implementation of the project began in the middle of 1984 and construction began in mid 1985. The project is expected to be completed by 1990.

Colombia

Currency: Peso 235 = $1
Population: 28,700,000
Official language: Spanish
Population growth rate: 2%
GNP per capita: $1,112
Life expectancy: 65 years
Infant mortality per 1,000 births: 72
Water diseases per 100,000: 8,000
Adult literacy (M/F): 89/87
UNDP resident respresentative:
Apartado Aero 091369, Bogota

WATER AND SANITATION AGENCIES

Instituto Nacional de Salud, Centro Administrativo, CAN Bogota

National Institute of Urban Development INSFOPAL, Centro Administrativo, Block 2, CAN, Bogota
Telephone: 690177

Departamento Nacional de Planeacion (DNP), Calle 26 No. 13-19, Piso 5, Bogota

Empresa de Acueducto y Alcantarillado de Bogota De, Calle 22c, No. 40-99, Bogota
Telephone: 448520

Ministerio de Desarrollo, Carrera 13, No. 27-00, Bogota

The Republic of Colombia is bordered by Ecuador, Peru, Brazil, Venezuela and Panama and its climate depends largely on altitude. Annual precipitation ranges from 600mm to more than 8,000mm.

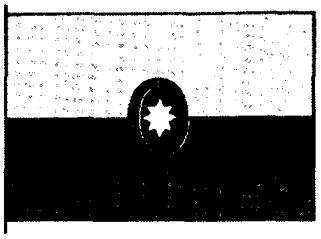
Surface water is abundant, except in the arid Guajira region. Groundwater potential has not been assessed in many areas and water quality is affected by the discharge of untreated wastewater in the metropolitan areas of Bogota, Medellin and Cali. These three cities, together with Barranquilla, each have more than a million residents, accounting for half of the total urban population.

About 83% of Colombia's urban population have access to piped water through house connections, and about 65% are served by a sewerage system. In rural areas, where 9 million people live, 18% of the population has access to piped water and only 10% has ade-quate sanitation facilities.

Water pollution has become a major problem: in 1982, the infant mortality rate which can be partly attributed to poor water quality and sanitation was 54 in 1,000 live births, compared with 27 in Chile, 39 in Venezuela, 44 in Argentina and 53 in Mexico.

The government, under its plan for "development with equity" is aiming to provide adequate water and sanitation services to all citizens. For 1990, it has adopted coverage targets of 90% of the population for water supply and 80% for sewerage for urban areas; and service levels of 40% for water supply and 35% for sewerage for rural areas. This means reaching an additional 5.5 million people in urban areas and some 2 million in rural areas.

This would require an annual investment of $400M excluding operations and maintenance costs. The government recognises that maintaining this



level of investment, which is over three times the historic average for the sector, will be a difficult task given weaknesses of sector institutions and borrowing constraints. Consequently, it is re-examining sector policies and institutions, with emphasis on adequate cost recovery, investment and credit policies, tariff policies and a stronger institutional framework.

Since 1968, the World Bank has made 11 loans totalling $381M for water supply and sewerage development in Colombia. The largest borrower has been the Bogota Water and Sewerage Company to which the bank has lent $261M. Most projects have experienced lengthy delays in execution and shortfalls in financial and institutional development goals. Delays in project execution, in an inflationary environment, have resulted in cost overruns for most projects.

Nevertheless, lessons learnt from the implementation of earlier Bank projects in Colombia have been taken into account in the preparation of subsequent projects. Demand and financial projections are made using more conservative estimates of population growth and water consumption. More realistic implementation schedules are being adopted, and projects are presented to the Bank only when a substantial part of the physical works is ready for bidding.

The water supply and sewerage sector is under the responsibility of the Ministry of Public Health, which, in co-ordination with the National Planning Department, formulates national sectoral policies. Two institutions, the National Institute of Urban Development (INSFOPAL) and the National Institute of Health (INAS) are responsible for implementing these policies in urban and rural areas, respectively.

In the smaller towns, water supply and sanitation services are provided by sanitation works companies over which INSFOPAL exerts considerable influence. In rural areas, water and sanitation facilities are built, operated and maintained by departmental offices of INAS in co-ordination with the beneficiary communities. Water and solid waste tariffs are controlled by the National Tariff Board which acts on proposals submitted by operating companies.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
16,000	11,840	4,160	9,760	6,240	9,000	7,110	370
(1985 Actual)					(1985)		
18,532	13,899	2,925	10,193	N/A	7,993	1,599	959
(1990 Targets)					(1990)		
19,196	15,549	2,160	11,518	N/A	8,280	3,312	2,070

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
150	100	120	90

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,770
Investment totals (US $ millions 81-85)	900

Comoros Islands

Currency: CFA Franc 305 = US$1.00
Population: 390,000* (excl. Mayotte)
Official language: Arabic
Population growth rate: 3.3%*
GDP per capita: $250 (1984)*
Life expectancy: 46 years (1981)**
Infant mortality per 1,000 births: 151.7 (1981)**
Adult literacy: 58% (1981)**
UNDP resident representative: Route du Bord de Mer, BP 648, Moroni

*EEC *Courier*, No. 98, July-August 1986.
**UN Division for Economic & Social Information, 1981.

WATER AND SANITATION AGENCIES:

Electricité et Eau des Comores, Ministère de l'Equipment, Moroni

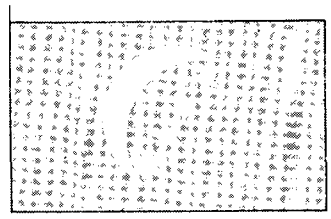
Though the Comoros group consists of four main islands (with many smaller ones), the island of Mayotte, the third largest remained under French colonial rule when the other islands became independent in July 1975. The archipelago lies in the Mozambique Channel about 300km east of the Mozambique coast and 350km north-west of Madagascar.

The islands have a typical tropical marine climate and rich soils supporting much vegetation. All of them, however, suffer from increasingly serious problems of land erosion and polluted water supplies.

The largest island, Grande Comore or Ngazidja, covers 1,148km^2 and is the highest and most densely populated. The topography is dominated by a 2,361m-high volcano which erupted as recently as 1977. The other main islands, Anjouan or Ndzouani (324km^2) and Mohéli or Moili (290km^2), are also volcanic.

Because of the high permeability of the volcanic rocks on Grande Comore, there is little runoff from the rainfall despite heavy precipitation. Small springs supplied by high sources can be found in the interior and a general aquifer underlies the inland region. Closer to the surface nearer the coast, this aquifer flows into many springs below sea level which appear when the tide goes out.

Apart from the population of the island's two urban centres, who have a public water supply system based on

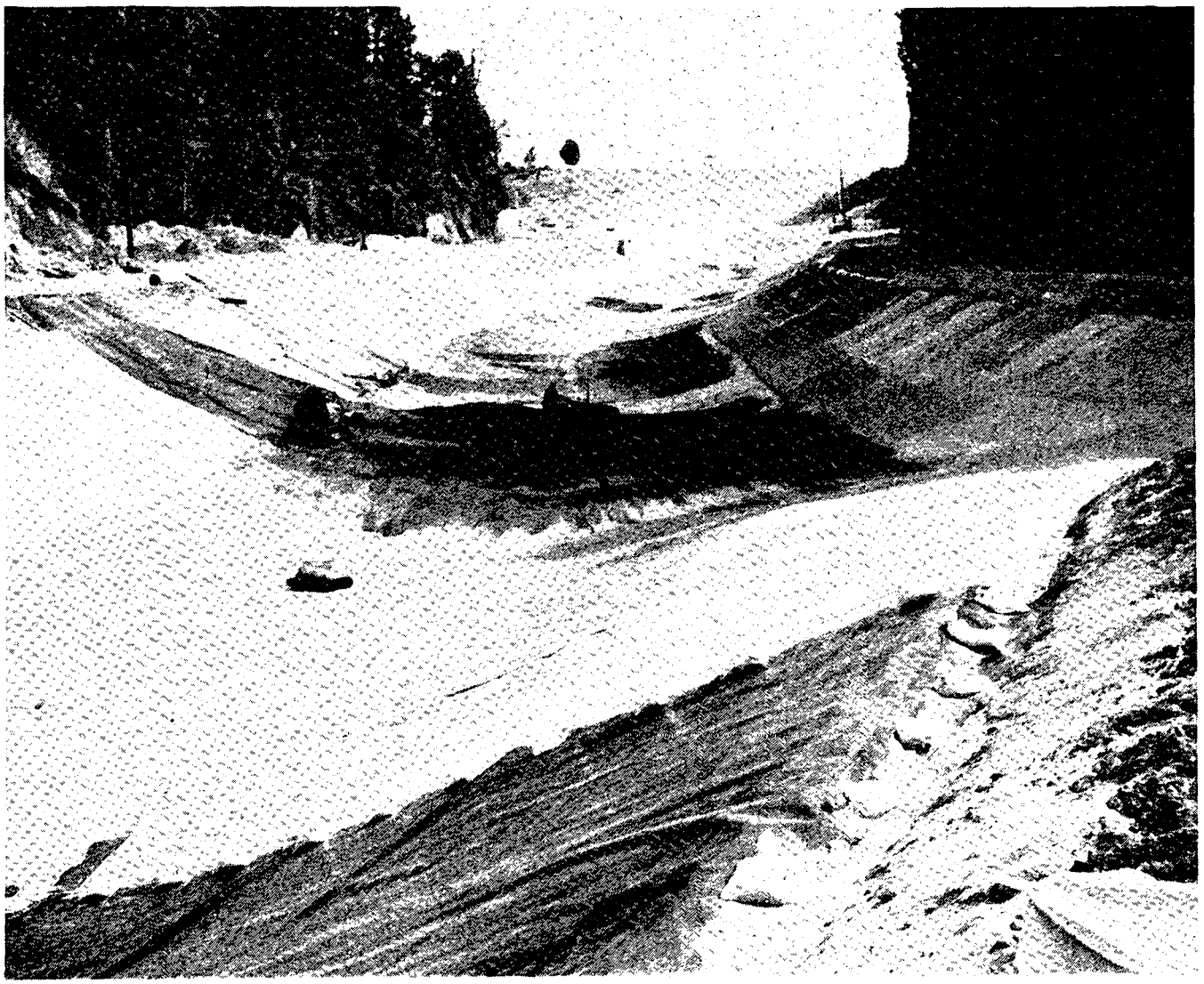


ground water, the population of Grande Comore relies on tanks supplied by rainwater caught from roofs, badly protected springs, brackish water springs and tide wells along the coast. None of these is entirely satisfactory and in dry periods, the rural water supply situation becomes critical.

During 1983, the UN Department for Technical Cooperation and the UN Development Programme executed a project to construct concrete-lined wells of 1.6–1.8m diameter along the coast to depths of between 20 and 45m. Many small springs were also equipped for regular use and several villages in the hilly areas of Grande Comore are now supplied by a gravity-fed piped system.

Under the Lome II convention, the European Economic Community has provided around $4M for studies and construction of water supply systems for Fomboni on Mohéli island and Mutsamudu on Anjouan island. These were completed by 1986, though some technical assistance was still being provided to Electricité et Eau des Comores.

Water-the Resource of Life.



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West-Germany
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Congo

Currency: CFA Franc 305.00 = US$1.00
Population: 1.9 million* (63%) urban
Official language: French
Population growth rate: 2.7% (1983)
GNP per capita: $1,110*
Life expectancy: 58*
Infant mortality per 1,000 births: 180 (1983)
Water diseases per 100,000: N/A
Adult literacy (M/F): 71/55

*World Bank (1985)

UNDP resident representative: Avenue du Marechal Foch, BP 465 et 51, Brazzaville.

WATER AND SANITATION AGENCIES

Société Nationale de Distribution d'Eau (SNDE), Brazzaville.
Tel: 81.41.69/81.38.83

Ministère du Plan et de l'Economie, Brazzaville.
Tel: 81.35.45/81.43.24

Ministère des Travaux Publics, de la Construction, de l'Urbanisme et de l'Habitat, Brazzaville.
Tel: 81.10.11/81.44.79

Ministère du Développement Rural, Brazzaville.
Tel: 81 81.18.13/81.03.09

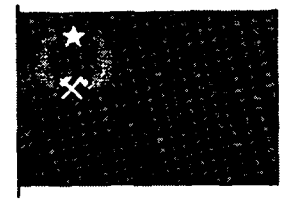
The People's Republic of the Congo covers an area of 342,000 km^2 in central Africa. Its mean annual rainfall of 1,700mm accounts for the abundance of surface water in the country and this provides the main source of drinking water. Groundwater sources are available, but they have yet to be exploited.

At the start of the Decade, about 25% of the total population were supplied with water from public systems. Almost all these people were in the two major urban centres within which 40% (352,000 people) had a safe water supply either by house connections or public standpost. By 1983, the number of people covered in urban areas had increased to 424,000, maintaining the same percentage coverage of the population, which had increased to 1,059,000. No figures are yet available for 1985.

The sanitation coverage among the 879,000 urban population at the start of the Decade was nearly 17%, or 147,000 people. By 1983, this figure had risen to 212,000 representing an increased coverage to 20% of the urban population of 1,059,000. Once again, no figures are available for 1985.

Coverage of both water supply and sanitation in urban areas is targetted to reach 100% by 1990, when the urban population is estimated to be 1,354,000.

Safe rural water supply at the start of the Decade was practically non-existant despite the existence of a special service, part of the Ministère de l'Economie Rurale. The situation had not improved by 1983 and no figures are available for 1985, although an intermediate target of 369,000 or 60% to be covered has been set for that year. The 1990 target is 96%.



A roughly similar situation exists with regard to rural sanitation.

Figures were produced in 1983 for unit costs of construction and supply. The per-capita construction cost for urban water supply was $171, while in rural areas it was $49. For urban sanitation, the per-capita cost was $190, while sanitation in rural areas cost $73 per capita.

Average cost of production of drinking water in 1983 was $0.50/m^3, while the average tariff charged for supply was $0.22/m^3.

The Société Nationale de Distribution d'Eau (SNDE) is charged with planning and construction of systems for urban water supply. For rural areas, this service is carried out by the Service du Génie Rural. The two organisations combine to provide urban sanitation, while the SNDE and the Service du Génie Sanitaire are responsible for planning and providing assistance with rural sanitation. Operation and maintenance are also the responsibility of these two organisations.

Cook Islands

Currency: NZ dollar 1.66 = US$1.00
Population: 17,450 (54% urban)
Official language: Polynesian Maori/English
GNP per capita: US$7,170*
Life expectancy: 64 years
Infant mortality per 1,000 births: 32.20

*World Bank (1985).

UNDP resident representative: Laufo Meti's Building, Four Corners, Matautu-uta, Private Mail Bag, Apia, Western Samoa

WATER AND SANITATION AGENCIES

Ministry of Work, Water Supply Division, PO Box 102, Rarotonga.
Telephone: 20 034
Telex: 62031 MOWORKS RG

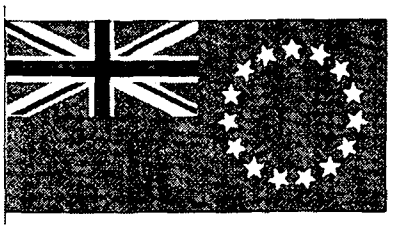
Ministry of Health, Public Health Division, PO Box 109, Rarotonga
Telephone: 22 664

The Cook Islands comprise 15 islands spread over an area of 2.2M.km^2 in the South Pacific and have a land area of 236km^2. There are two groups of islands, the Northern group of atolls and the southern group which are of volcanic origin. Rarotonga is the largest island and is capital of the country. Annual rainfall in 2,000mm.

The southern islands have limited surface and groundwater resources while to the north, islands mainly depend on rainfall. Only Raratonga has good surface water and groundwater resources, which have not been fully explored.

The government is actively pursuing a programme of water supply and sanitation development in the country with priority on the upgrading of the Rarotonga water supply system, the provision of rainwater storage facilities in the Northern group of islands and a combination of underground, surface water and rainwater storage in the southern group. Various projects are now being implemented in the sanitation sector: a pour-flush toilet for every household in the Northern group and on three of the five islands in the southern group (facilities for the other two islands are being programmed).

In all of these programmes the Ministries of Health and Works are working closely together with WHO providing the technical assistance. Plans have been made by WHO for a safer sewage effluent and sludge disposal



in Rarotonga and await final government action on funding.

Institutional structure at all levels as well as administrative and financial policies and procedures are still inadequate to meet the demands of the Decade approach, but the government is taking steps to remedy the situation.

There is a shortage of trained staff in many categories, particularly at the national and village level. As yet, there is no plan for human resources development mainly because the country lacks sufficient appropriate personnel for training. WHO and other outside aid agencies are at present filling the gap especially where technical expertise is required.

Most of the project proposals have attracted external finances, mainly outright grants-in-aid from various donor agencies. All basic materials and equipment for construction are imported, but suppliers have been identified and the requirements are readily met.

While there is a good coordination between the Ministry of Health and the Ministry of Works on water supply and sanitation programmes, there has been conflict with the newly created Infrastructure Office which is directly controlled by the Prime Minister: particular problems have arisen on the order of priorities and the application of appropriate technology.

Despite WHO granting fellowships and training to country personnel the schemes have been hampered by a lack of candidates. The Decade programmes will continue to be dependent on imported materials and equipment because of the small size of the projects: they do not warrant the promotion of local production, except for the construction of ferro-cement tanks.

WHO country personnel are already preparing an integrated rural water and sanitation project for every island and village, plus project documentation and assistance in the implementation. They are also liaising with the relevant government agencies and assisting in the formation of a water authority..

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
9.5	9.4	-	-	9.5	8.00	5.00	4.80
(1985 Actual)					(1985)		
9.45	9.40	-	-	9.45	8.00	7.00	7.95
(1990 Targets)					(1990)		
10.00	10.00	0.00	0.00	10.00	10.00	10.00	9.50

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
96.00	-	-	60.00	75.00	15.00

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
500.00	80.00	550.00	30.00

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.40	0.00	NO

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	2
Investment totals (US $ millions 81-85)	1

Costa Rica

Currency: Colon 62.3 =US$1.00
Population: 2.6M
Official language: Spanish & English
Population growth rate: 2.5%
GNP per capita: $1,300
Life expectancy: 74 years
Infant mortality per 1,000 births: 18.6
Water diseases per 100,000: N/A
Adult literacy (M/F): 94/93

UNDP resident representative:
Apartado Postale 4540, San José

WATER AND SANITATION AGENCIES

Instituto Costarricense Acueductos y Alcantarillado,
PO Box 5120-1000 San José

The Republic of Costa Rica is situated in Central America between Nicaragua and Panama; the country is accessible to both the Atlantic and Pacific Oceans and covers a land area of 50,909km^2 of which 100km^2 is made up of islands.

Topography includes the high dorsal mountain chain which extends for 500km from one border to another and includes the highest elevations.

There are three different climatic zones: the tropical Lower Atlantic, the temperate Central plains with altitudes of between 1,000m and 2,000m and the variable Pacific belt where marked fluctuations between drought and precipitation occur.

Rainfall varies according to the zone from a maximum of 1,500mm a year in the Pacific region to a maximum of 3,400mm in the Atlantic zone. Certain mountain areas have recorded rainfall of up to 8,000mm a year.

The country has 34 river basins. Its major river, the Rio Grande de Terraba, is 160km long and has a 5,077km^2 catchment area. Surface and groundwater resources are abundant, but surface water is often polluted by industrial, agricultural and domestic waste. Indeed, in 1985, 7% of the total population were without safe water and 5% were without safe sanitation.

In the urban areas, 98% had drinking water supplies by house connection and 2% by standpost. Half a million people in the urban communities, or 37%, had sewer connections and almost a million, that is 63%, had sanitation services by other means.

In rural communities, 82% had water supplies and 88% had adequate sanitation.

Targets for the Water Decade include servicing 75% of the urban population with sewer connections and 25% by other means. In rural areas, 85% should be supplied with drinking water and 95% covered by adequate sanitation.

Main constraints on supply and sanitation development include: disparity between project costs and recuperation; planning and design problems; insufficient numbers of trained personnel; and inappropriate technology.

In December 1984, the Inter-American Development Bank approved two loans to Costa Rica totalling $28.3M to improve potable water supplies for 281,000 urban dwellers and 19,300 rural inhabitants and to provide sewerage services to 23,400 residents in Puntarenas. The loan was extended to the Instituto Costarricense de Acueductos y Alcantarillado (AyA), the organisation responsible for project implementation.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 1,090	1,040	5	470	55	(1980) 1,120	760	920
(1985 Actual) 1,478	1,448	30	542	936	(1985) 985	808	867
(1990 Targets) 1,681	1,647	34	1,261	420	(1990) 1,120	952	1,064

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
94	N/A	106	23.5	65	N/A

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.17	0.07	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	217
Investment totals (US $ millions 81-85)	66.2

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
250	150	200	100-125

Côte d'Ivoire

Currency: CFA franc 307 = US$1
Population: 9.8 million
Official language: French
Population growth rate: 3.4%
GNP per capita: US$660
Life expectancy: 53 years
Infant mortality per 1,000 births: 120 (1980)
Adult literacy (M/F): 53/21

UNDP resident representative: Angle rue Gougas et Avenue Marchand, 01 BP 1747 Abidjan

WATER AND SANITATION AGENCIES

Direction Centrale de l'Hydraulique (DCH), Ministère des Travaux Publics & des Transports, Immeuble La Pyramide 13eme étage, Abidjan 01

Société de Distribution d'Eau de la Côte d' Ivoire (SODECI), BP 1843 Abidjan 01
Telex: 3395 AMURAL
Telephone: +225 32 04 33

Ministère de la Santé Publique & de la Population, Service National d'Education pour la Santé (SNES), Abidjan

Société d'Equipment des Terrains Urbains (SETU), BP 21181, Abidjan.

Société d'Equipment des Terrains Urbains (SETU), BP 21181 Abidjan

Ministère de l'Agriculture, des Eaux et Forêts, BP V 82, Abidjan

One source* puts the level of potable water service in 1984 in towns and cities in Côte d'Ivoire at between 70% and 93%. In the same year, quoting ministry figures, the authors report's estimate that 5 million people in rural areas have a safe water supply. The rural water supply programme, begun in 1974, had completed 12,000 wells in 8,600 villages by 1984, and expected to reach its target of 15,000 water points serving 6 million rural people by the end of 1985.

Responsible agencies

All activity in the provision of drinking water is the responsibility of the Direction Centrale de l'Hydraulique (DCH), part of the Public Works & Transport Ministry. However, development is subcontracted to SODECI, which supervises exploitation and undertakes urgent pump repairs. Until 1981, financing was provided by the Fond National de l'Hydraulique (FNH), but now falls to village collectives which must raise 60,000 CFA francs per well or borehole per year.

Urban sanitation is the responsibility of the Direction Centrale de l'Assainissement (under Public Works), which coordinates activity in the sector and advises the Direction du Drainage & de l'Assainissement. SODECI has a maintenance role in part of the capital, Abidjan.

Financial management of sanitation is undertaken by the Fond National de l'Assainissement (FNA), whose resources are supplemented by external finance (chiefly the World Bank). Subscribers are expected to pay for connections from their property to the service provided by the state beneath the public highways as far as the perimeters of properties. Direct taxes on sanitation are meant to finance investment and development, but the principle has been difficult to maintain in the past.

SODECI and DCH conduct public information campaigns on water supply and conservation by organising "water weeks", and the Service National d'Education pour la Santé (SNES) has since 1982 conducted in collaboration with rural health sections a programme of sanitation and health education. This is aimed at local government and rural health personnel, and village communities. In the villages it is achieved by the creation of sanitary development agents (ADS).

**JK Koffi, MK Koffi, E Danguy, CA Adjorlol, G Guessennd: "Hydraulique Humaine et Santé Publique en Côte-d'Ivoire," published in* Medicine Tropicale *April-June 1986.*

Decade targets

Except from the source quoted, there are no recent data on how far Decade targets have been met. In 1980, it was hoped that 90% of the urban population would have house connections by the end of the planning period 1981-1985, with the remaining 10% using standpipes. The policy favoured mains connections in stable residential areas and standpipes in marginal zones. In 1976, it was decided the FNH should pay for mains connections for the urban poor, who would be charged only for consumption.

A national equalisation scheme allowed low prices in the poorer inland towns without penalising the poor in the capital. All new works are funded by tariffs, releasing other resources to pay for free water at urban standpipes and the rural water and sanitation programmes.

In urban sanitation, Abidjan has been given priority, and most efforts concentrated there. In 1979, an emergency programme brought new city zones into the main network. By the end of the Decade, the city's masterplan envisaged foul and stormwater sewerage networks for the whole capital area, with effluent treatment and disposal from sea outfalls. Three-quarters of the population would be connected, and another 20% served by septic tanks.

With the exception of San Pedro and Bouake, nothing had been done for the sanitation of inland towns by 1980.

Except for the education policy of the water supply and health agencies, there were no plans for rural sanitation works.

Investment needs

There are no recent data on spending so far or the amounts needed to meet Decade targets. However, in 1980 the government reported that rural water supply and all sanitation targets depended on external aid. In the past, multilateral and bilateral aid was insufficient to obviate the need for credit arrangements.

Only urban water supply, with its tariff policy, was protected from external influences, but the government was warning in 1980 that this method of financing had reached its limits.

Cuba

Currency: Peso 0.78 = US$1.00
Population: 10.1 million
Official language: Spanish
Population growth rate: N/A
GNP per capita: US$1,410 (1980)
Life expectancy: 77 years
Infant mortality per 1,000 births: 16*
Water diseases per 100,000: N/A
Adult literacy (M/F): 96/96*

*UNICEF, 1985/6

UNDP resident representative: Calle 18 No 110, Apartado Postal 4138, Havana

Recent figures for water supply are not available, but, in 1980, service was already reported good. House connections reached 90% of the populations of 15 major provincial towns and another 500 urban communities were 80% covered. In 899 rural communities 30% of residents had house connections, 20% access to standpipes. Standpipes also served 20% of the populations of dispersed rural communities.

However, in 1984 and the early part of 1985, rainfall was only 61% of average causing severe shortages and rationing in Havana. It was reported that fifty wind-pumps were installed to supplement the supply from groundwater.

Industry and domestic consumers in Santiago de Cuba have a new supply from a $9.7M dam completed in 1985 outside the city to impound 34M.m^3.

Sanitation

Although provincial towns were well served in 1980, with 67% using public sewers, it was reported that up to 90% of people in conurbations relied on pit privies and latrines. The Decade plan omitted a target for large cities, but planned five public sewerage schemes for urban communities with between 10-35,000 people. It is not known what the present level of coverage is.

WATER AND SANITATION AGENCIES

Comision de Proteccion del Medio Ambiente, Capitolio Nacional, Havana

Direccion Provincial Acueducto Alcantarillado y Drenaje Pluvial, Havana

Ministerio de Construccion, Havana

Instituto de Hidroeconomica, Manserrate 213, Havana

Ministerio de Salud, Havana

Cyprus

Currency: Pound 0.48 = US$1.00
Population: 541,000 (63.5% urban)
Official languages: Greek and Turkish
Population growth rate: 1.2%
GNP per capita: 3,572
Life expectancy: 74.65 years
Infant mortality per 1,000 births: 12
Water diseases per 100,000: N/A
Adult literacy: 93.1%

UNDP Resident Representative: 22 Demosthenis Severis Avenue, PO Box 3521, Nicosia, Cyprus

WATER AND SANITATION AGENCIES

Ministry of Health, Byron Ave, Nicosia, Cyprus
Telephone: +357 (2) 402284

Department of Town Planning & Housing, Demosthenis Severis Ave, Nicosia, Cyprus
Telephone: +357 (2) 402362

A large island in the Eastern Mediterranean, Cyprus has a total land area of 9,251km^2. Since 1974, the northern 40% of the island has come under Turkish rule. The information in this entry refers to the southern part of the island which is controlled by the Cyprus Government and is divided into six districts.

Cyprus has a semi-arid climate and one of the Government's main objectives is to develop water resources for the daily human needs of the population, for agriculture, and for the tourist industry.

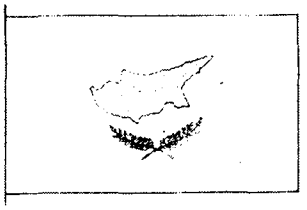
All urban and rural areas have reasonable access to water but there is a shortage during the summer months. Most of the population has adequate sewage disposal facilities.

It is estimated that in 1990 the urban population in the Government-controlled areas will be 376,400 and the rural population 196,900. An important water scheme, the Southern Conveyor Project, is underway and should be implemented before 1990. It will improve supply for Nicosia, Larnaca, Limassol and Famagusta.

About 100,000 people will be served by sewerage connections by 1990 and 276,400 will be served by septic tanks. The rural population will have pit privies and septic tanks.

Water Boards are responsible for the supply and distribution of water n Nicosia, Limassol, Famagusta and Larnaca, while in Kyrenia and Paphos the municipal authorities are responsible. Water Boards and the municipal agencies come under the jurisdiction of the Ministry of the Interior.

In rural areas, where Development Boards, elected by popular vote, exist, they are the appropriate authority for water supply and distribution. In other



cases Water Commissions chaired by District officers have this responsibility. Both are under the jurisdiction of the Ministry of the Interior.

Most water for domestic use comes from underground supplies drawn from natural springs and boreholes. There are two treatment plants and two more, for Limassol and Larnaca were in the planning stage in 1985.

Government policy is to design for between 200-250 litres/head/day in urban areas and 130 in rural. Priority is given to areas facing water shortage irrespective of whether these are in urban or rural areas.

Major projects are designed and built through international tender and financing is undertaken by Government against loans contracted with international financing institutions.

Responsibility for planning, design and construction rests with the Department of Water Development, Ministry of Agriculture & Natural Resources. On completion, the schemes are handed over to the relevant authority for administration and operation.

Water Boards in urban centres finance necessary works while in the rural areas the government subsidizes 50% of the project cost. Some regional water supply schemes are wholly financed by government and in such cases water is made available to individual communities against the payment of a fixed price.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)		N/A			(1980)	N/A	
(1985 Actual)					(1985)		
344	343	0	50	294	198	198	198
(1990 Targets)					(1990)		
376	376	0	100	276	197	197	197

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
250	150	220	130

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.4	0.35	YES

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	430	290	N/A	290

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	115
Investment totals (US $ millions 81-85)	N/A

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As the world's oldest engine manufacturing company, KHD-DEUTZ can look back on more than 120 years of successful engine technology. The production programme covers air-cooled diesel engines from 2.3 up to 441 kW (3.1–600 HP) all of which are premium products.

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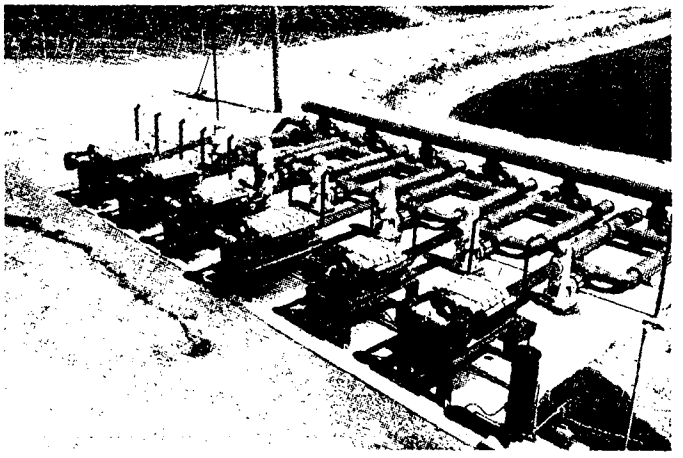
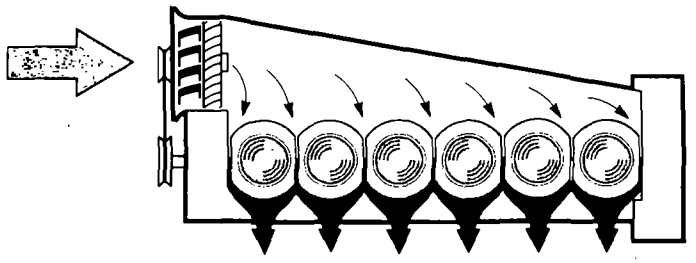


Large plant with air-cooled DEUTZ diesel engines.

It's not only the heavy duty characteristics of these engines, but also the advantages of DEUTZ air-cooling that have made these engines such a success.

DEUTZ Diesel Engines Are Cooled by Air.

Air-cooling is a direct cooling system. This means that cylinders and cylinder heads are cooled with air directly. It is the simplest way of engine cooling.



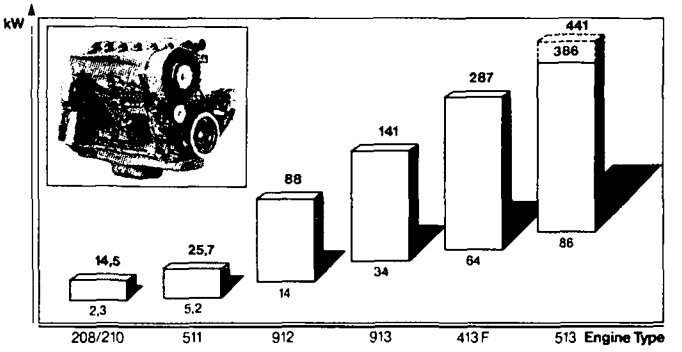
Air-cooled DEUTZ diesel engines are insensitive to climatic influences. Whether operating in arctic regions or in hot climatic zones, they are always reliable. In the hot and dusty regions of North Africa and the Arab countries alone, about 310,000 of them are operating successfully, i.e. in regions where irrigation is one of the most important tasks.

They offer a decided advantage: the reliability of the cooling system of air-cooled DEUTZ diesels allows unattended operation of the engine, and thus of the complete irrigation system.

Irrigation Power up to 525 HP With Only Four Engine Families.

DEUTZ Air-Cooled Diesel Engines

– Power Range 2.3–386 (441) kW –



Full Line Programme

With these engines KHD-DEUTZ offers a full line of engines for driving irrigation pumps.

The successful performance of the DEUTZ air-cooled engines is evidenced by production facilities and manufacturing under licence in all parts of the world. It is above all countries with extreme climatic and any other adverse conditions, as far as engine operation and after-sales service are concerned, which have obtained manufacturing licences for this favourable engine concept.

DEUTZ Diesel Engines – The Most Economic Way of Pumping.

This concept as well as ease of maintenance keep the DEUTZ engines' downtimes to a minimum. Thanks also to very low fuel consumption, the life cycle costs range among the most favourable which can be achieved in the diesel engine sector today. And this is proved day by day in demanding applications. More than 200,000 DEUTZ diesel engines are successfully operating in irrigation worldwide. In "pumping contests" for the lowest fuel consumption in the majority of cases DEUTZ air-cooled engines end up winners. As the cost of fuel is the biggest chunk out of life cycle costs, fuel economy is the easiest way of saving money.

What applies to worldwide production and operation of DEUTZ air-cooled diesel engines is true for the service network. More than 3,000 service bases all over the world ensure efficient back-up service to keep engines running, to let your plantations flourish and bear fruit for a generous harvest.

For more information:

Klöckner-Humboldt-Deutz AG, Dept. AS-V
D-5000 Cologne, P.O. Box 800 509,
Phone: 221-8221, Telex: 8 812-0,
Telefax: 221/822-35 25

Czechoslovakia

Currency: Koruna 5.5 = US$1
Population: 15,503,406
Official language: Czech, Slovak
Population growth rate: 0.29%
GNP per capita: $3,785
Life expectancy: 70.58 years
Infant mortality per 1,000 births: 14
Water diseases per 100,000: N/A
Adult literacy (M/F): 100%

WATER AND SANITATION AGENCIES

Ministerstvo Lesniho a Vodniho Hospodarsdtvi CSR,
Vrs SNB 65,
Praha 10, Czechoslovakia.
Telephone: +42 (2) 73 94 51, 74 32 51

Ministerstvo Zdravotnictvi CSR,
Vin W Piecka 98,
Praha 10, Czechoslovakia.
Telephone: +42 (2) 73 06 51.

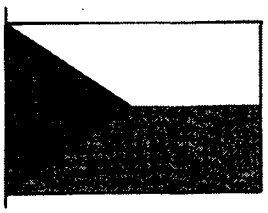
The 127,903km^2 land area of Czechoslovakia supports a population (1985) of 15.5 million people, 64% of whom live in urban areas. By the end of the Decade this is expected to rise slightly to 15.6 million, while the urban percentage will have gone up to 66%.

The country is divided into 11 regions, which bear little relation to the former provinces of Bohemia, Moravia and Slovakia that preceded the country's establishment as a Socialist Republic. Regional water supply and sewerage authorities control overall planning, water quality, operation and maintenance for all water supplies and urban sanitation. Planning also involves the Ministry of Forestry & Water Management and the Regional National Councils, who are responsible for obtaining finance.

Construction of all water supply and sanitation works is the responsibility of the National Company for Water Engineering Works, assisted for water supply works by the National Company for Water Resources. Construction is supervised in urban areas by the Water Development & Construction Engineering Company.

Planning and design of all water and sanitation projects is the responsibility of Hydroprojekt Design & Engineering Co.

Other bodies involved in the sector include the Water Research Institute, which gets involved with groundwater



exploration and water quality control; the State Water Management Inspection, which monitors water quality and rural sanitation; and the Hydrometeorological Institute, which also has a role in water quality control.

According to the Ministry of Forestry & Water Management, funding limitations are a very severe constraint on improvement of water and sanitation services, while other constraints are inadequate water resources and inadequate cost-recovery framework.

A plan for the Decade was completed on 1 January 1981 with targets that have since been raised. These have been integrated into the national development plan.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	4,386
Investment totals (US $ millions 81-85)	2,167

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 9,616	8,462	1,154	6,731	2,885	(1980) 5,667	5,667	5,667
(1985 Actual) 9,922	8,830	1,092	7,441	2,481	(1985) 5,581	5,581	5,581
(1990 Targets) 10,305	9,275	1,030	8,244	2,061	(1990) 5,309	5,309	5,309

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
363.06	242.30	357.12	238.11	119.01	122.03

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
395	300	385	290

UNIT COSTS OF WATER PRODUCTION (US$/m^3)		
Average cost	Operation average water tariff	Progressive water tariff
0.45	0.35	YES

Denmark

Currency: Krone 6.9 = US$1.00
Population: 5.1 million*
Official language: Danish
Population growth rate: N/A
GNP per capita: $11.200*
Life expectancy: 75 years
Infant mortality per 1,000 births: 8*
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

*World Bank mid-1985

WATER AND SANITATION AGENCIES

Miljoministeriet (Ministry of Environmental Protection) and **Miljostyrelsen** (National Agency of Environmental Protection), Strandgade 29, DK-1401 Copenhagen K.
Telephone: +45 (1) 57 83 10
Telex: 31209 MILJOE DK

Sundhesstyrelsen (National Health Service), Store Kongensgade 1, DK-1264 Copenhagen K.
Telephone: +45 (1) 14 10 11

Copenhagen Water Supply, Axeltorv 12, DK-1609 Copenhagen V.
Telephone: +45 (1) 15 76 82

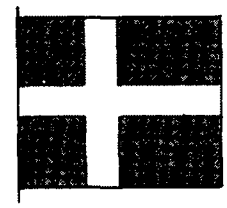
A member of the European Economic Community, Demark's 43,100km^2 is distributed differently from other Western European countries in that it comprises several hundred islands as well as a continental zone, Jutland. Nowhere in Denmark is more than 65km from the sea.

Though this makes Danish rivers short, the country has rich groundwater resources. Potable water is almost totally derived from this source and can be used virtually without treatment. This has led to a concentration of water policy based on protecting groundwater sources, since only in Copenhagen is treated surface water used to any extent.

In 1982, some 85% of the population were served by public water supply provided by more than 100 organisations, mostly run by municipalities, but some by private companies. The remainder used their own sources.

Only 2% of the population in 1982 were not served by public sewers and only 10% were not served directly by municipal sewage treatment works. Disposal of wastewater to land is only permitted in rural and recreational areas without important groundwater resources, and thus nearly all wastewater is discharged to rivers, lakes and the sea.

Since 1974, regional and municipal authorities have had responsibility for water resources, and a new law in 1982



transferred river management functions to these bodies as well.

Under the Water Supply Act, revised in 1978, each municipality must draw up a watersupply plan for approval by the regional authorities. This describes resources and existing and future facilities. Abstractions of groundwater of more than 6,000m^3/year must be approved by the regions, but below this figure approval may be granted by municipalities.

Water quality is covered by the 1974 Environmental Protection Act. There are no national emission standards, but wastewater treatment plants now have to be built to standards which depend on the capacity of the receiving water to absorb the effluent. Permits for discharges are issued by municipalities according to guidelines published by the National Agency for Environmental Protection.

Water supply and wastewater treatment systems are financed by the consumers and users with no government help. Industries are, however, entitled to a refund of about 25%.

Djibouti

Currency: Franc 177 = US$1.00
Population: 430,000 (75% urban)
Official language: Hamitic
Population growth rate: 3%
GNP per capita: $480 (1981)
Life expectancy: 48 years**
Infant mortality per 1,000 births: 200
Water diseases per 100,000: N/A
Adult literacy (M/F): 15*/9*

*UNICEF, 1985
**World Bank, 1985

UNDP Resident Representative: Boulevard de la Republique, BP 2001, Djibouti, Republic of Djibouti

WATER AND SANITATION AGENCIES

Regie des Eaux de Djibouti, Ministère d'Agriculture, Djibouti

Office National des Eaux de Djibouti, BP 1914, Djibouti

Direction de Planification, Presidence de la Republique, BP 6, Djibouti

A small country of about 23,000 km^2, Djibouti has no permanent river and an average rainfall of between 100-200mm. Most water supplies are taken from groundwater.

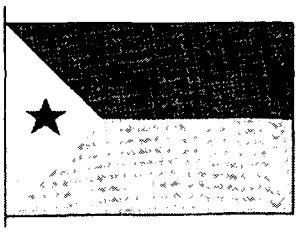
The Djibouti National Water Office (ONED) is an autonomous public institution under the Ministry of Industrial Development. It functions throughout the territory and assures Public Water Services management in the conurbation of Djibouti and in the four main towns - Sikhil, Ali-Sabhieh, Obock and Tadjourah. It works at three levels, technical, administrative and financial.

ONED has 26 drilled wells (with a drawn capacity of 24,000m^3/d) on the coastal plain of Djibouti. A second source of supply (2,000m^3/d) originates from a gallery excavated below Ambouli wadi). The 26,000m^3/d to be distributed throughout the city flows to sedimentation and storage tanks and receives sterilisation treatment before being pumped through the new pipeline at Ambouli into four reservoirs from where it is distributed by a network of 122,571m of pipeline.

Expansion of the city of Djibouti, and development of Balbala has led ONED to replace some deepwell pumps and part of the supply pipeline, boosting the amount of water available for distribution by about 20%.

Further improvement and modernisation work financed by the African Development Bank is now underway. Costing $4.5M, it will be used to: provide and install two standby generator sets and 22,400m of pipeline in Balbala; renew 11,000m of old pipeline in Djibouti, repair reservoirs, and provide and install eight piezometers to monitor the water-table.

Djibouti started the Water Decade with about 50% of the urban population



of Djibouti and the four urban centres having access to reasonable service. The rest of the population relied on water sold by water vendors at very high prices. In rural areas, it was estimated that about 20% had access to safe water. Plans for the Decade are for 50% of Djibouti city and 30% of other urban areas to have house connections and the rest of the urban population to be served by public standpipes. In rural areas, it is hoped to provide a water point for every 400 people, and for their animals.

About 43% of the urban population had individual household sanitation or sewer connections in 1981 and about 20% of the rural population had adequate sanitation facilities. Decade targets envisage 100% sewerage connections for Djibouti system, 100% coverage in other urban areas, and 100% adequate sanitation for rural populations.

The estimated cost of fulfilling Decade targets (1981 prices) was US$89.5M.

Shortage of trained personnel, especially trained technicians, is the main obstacle to development of the sector. Poor operation and maintenance, inappropriate technology and difficult logistics all constrain development. However, water supply is accorded a high priority by the government.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
274	109.6	27.4	—	63 —	56	11.2	11.2
(1985 Actual)					(1985)		
323	127	35	125	125	108	21	18
(1990 Targets)					(1990)		
405	N/A	N/A	N/A	N/A	30	N/A	N/A

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.4	0.55	YES

Dominica

Currency: East Caribbean Dollar 2.7 = US$1.00
Population: 80,000
Official language: English
Population growth rate: 0.57%
GNP per capita: US$1,150*
Life expectancy: 75 years*
Infant mortality per 1,000 births: 40**
Water diseases per 100,000: N/A
Adult literacy: 94.4%

*World Bank, 1985
**UNICEF, 1986

WATER AND SANITATION AGENCIES

Central Water Authority, 3 High Street, Roseau

Environmental Health Department, Roseau

Rainfall is ample on this 48,734km^2 island in the Windward group. Water-supply problems are limited to storage, treatment and distribution.

In 1983, there were 37 water systems with a total capacity of 36,000m^3/day. Water was taken untreated from rivers and distributed to 5,630 private connections (serving 43% of the population) and 528 standpipes. There were also 180 commercial and industrial premises with metered connections.

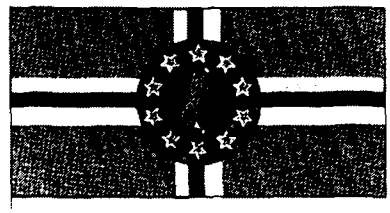
In heavy rain, river intakes often become blocked, cutting off supply to the capital, Roseau. Solving this by building a 3,600m^3 buffer store was the government's first priority in the sector in 1983, together with the replacement of the town's distribution network. In 1983, the government was tentatively proposing 90% soft loan funding for the $769,000 scheme.

In Portsmouth, it was reported in 1983 that the town's development was hampered by water shortages and an undersized distribution system which could not reach higher ground.

In the village of St Joseph, only about half the demand was met by the existing 245m^3/day supply in 1983.

Sanitation

The responsibility of the Environmental Health Department, this subsector was in need of drastic upgrading in 1983. The government was committed to



rehabilitation and extension of Roseau's sewerage system, including a treatment works, and construction of a system in St Joseph. In rural areas, excreta-disposal facilities were to be expanded by the promotion of deep pit latrines. It is not known what progress has been made.

External aid

The major obstacle to extending and improving the infrastructure is limited finance. Most loans come from the USA and Canada, and priority has been given to the agricultural sector, particularly in feeder road projects to develop exports - chiefly bananas.

Tourism is hampered by the island's inaccessibility, and an international airport is another government aim.

To increase local funding of sector projects, it was planned in July 1983 to introduce a tariff system designed to make the Central Water Authority self-financing. Such structural reform would also meet a condition of potential external lenders.

Dominican Republic

Currency: Peso 3.2 = US$1.00
Population: 6,400,000
Official language: Spanish
Population growth rate: N/A
GNP per capita: $790
Life expectancy: 64 years
Infant mortality per 1,000 births: 88
Water diseases per 100,000: N/A
Adult literacy (M/F): 78/77
UNDP resident representative: Apartado 1424, Santo Domingo

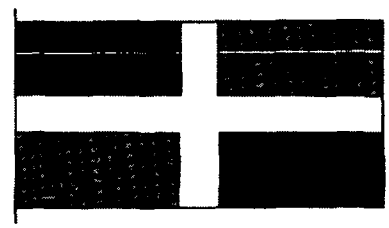
The Dominican Republic shares the island of Hispaniola, in the West Indies, with Haiti. The country's land area is 48,430km^2.

The land is varied and includes the Central Cordillera, which has some of the highest elevations in the Antilles - the archipelago enclosing the Caribbean Sea and the Gulf of Mexico.

Climate is sub-tropical - the island is in the path of tropical cyclones - and there is considerable variety in rainfall with mountain areas receiving more than 1,500mm a year, while the valleys and plains are relatively dry. There are five major rivers: the Artibonito, Yuna

WATER AND SANITATION AGENCIES

Instituto Nacional de Aguas y Alcantarillados (INAPA), Calle Presa de Tavera, Esquina Avenida Nunez de Caceres, Edificio INAPA, Centro Commercial El Millon, Santo Domingo



Ozama, Yaque del Norte and Yaque del Sur.

In 1985, 1.9 million people living in urban communities, or 58% of the urban population had drinking water supplies by house connection and a further 15% by standpost; 22% had sewer connections and 50% had other sanitation facilities.

In the rural areas, 24% of the population had water supplies and 59% had access to adequate sanitation.

No statistics are available for water supply and sanitation Decade targets for 1990, either for urban or rural areas. However, major constraints on sector development are financial limitations and the wide disparity between cost recovery through tariffs.

Ecuador

Currency: Sucre 5 = $1.00
Population: 9.4 million
Official language: Spanish
Population growth rate: 2.9%
GNP per capita: $1,160
Life expectancy: 66 years
Infant mortality per 1,000 births: 92
Water diseases per 100,000: 6,162
Adult literacy (M/F): 85/80

UNDP resident representative: PO Box 4731, Quito

WATER AND SANITATION AGENCIES

Instituto Ecuadoriano de Obras Sanitarias, Toledo y Lerida, Quito.

Empresas Municipal de Agua Potable de Quito (EMAP-Q), Garcia Moreno 883, Quito.

Empresas Municipal de Agua Potable (EMAP), Casilla 5253, Guayaquil.

Empresa Municipal de Alcantarillado de Gayaquil (EMAG), Primer Piso, Palacio Municipal, Avenida 10 de Agosto 112, Quito.

The Republic of Ecuador is bounded by Colombia to the North and Peru to the West and South. Including the Galapagos Islands in the Pacific, the country covers 454,752km^2.

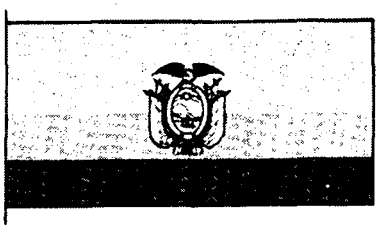
The country's climate is temperate in the Andes and humid in the lowland regions. Main exports include bananas, coffee, hemp and cocoa. Major ports are Guayaquil and Manta.

Ecuador has one of the fastest urbanisation rates in Latin America. From 1970 to 1985, the urban population grew at an annual average of 4.9%, compared with a rate of only 1.6% for the rural population. The two largest cities, Quito and Guayaquil, account for more than half of the country's urban population.

The result of this rapid process of urbanisation, has been a growing gap between demand and supply of housing and essential services. An estimated 43% of housing units are substandard and/or lack water, sewer or electricity connections.

In 1985, 43% of the total population lacked safe water while 45.8% went without safe sanitation. This may be broken down as follows: 76% of the urban population has access to a drinking water supply - via house connection, and 5% has access by standpost. In the rural areas, there is a bleaker picture: 31% of the rural population have access to a water supply. In terms of sanitation, 63% of the urban population were provided with sewerage connections, while 14% were provided with sanitary facilities by other means. In the rural communities, only 29% have access to adequate sanitation.

In September 1985, the Inter-American Development Bank approved a $24M loan to be used by the Empresa Municipal de Alcantarillado



de Guayaquil (EMAG), the municipal sewage company to improve environmental conditions and eliminate health hazards in the city's western suburb. This involved:-

(a) Construction of sanitary works and installation of 9,600 home service connection boxes.
(b) The construction of storm sewers and reinforced sewer mains.

Though the suburb holds only 5% of the metropolitan population, it has 500,000 inhabitants. These residents have built homes on swampy lowlands surrounded by inlets of the Gulf of Guayaquil and the Guayas river. Since the area is subject to periodic flooding, many of the houses practically float in water.

A further loan of $31M from the World Bank in 1986, was aimed at providing 900,000 people - about two-thirds of them the urban poor in Guayaquil - access to improved water coverage from 58% to 81% of the population. It will also provide increased water treatment and storage and rehabilitate the most deteriorated part of the distribution systems.

In the same year, plans were put forward by the Organisation of American States (OAS) and the World Bank, calling for the development of the Hubanas river basin from Machara on the Pacific coast inland to the foothills of the Andes. **Continued on page 62.**

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 3,676	1,739	1,289	1,332	111	(1980) 4,678	745	651
(1985 Actual) 4,881	3,710	225	3,075	688	(1985) 4,497	1,412	1,318
(1990 Targets) 5,977	4,889	191	4,178	903	(1990) 4,805	2,402	2,402

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
194.9	85	217.8	100	128.4	149.0

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
120-250	50-80	187	60

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.09	1.81	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,389
Investment totals (US $ millions 81-85)	394.9

Ecuador (continued)

A further loan, of $57.2M approved by the Inter-American Development Bank in February, 1987, will help finance an urban development programme, covering the costs of purchasing land and infrastructure works for drinking water systems, sanitation and storm sewers.

Advances in the Decade programme, should see 82% of urban dwellings connected to the water supply by 1990, with 3% serviced by standpost. Sewer connections should be available to 70% of the urban population, with 15% serviced by other means. In the rural areas, the Decade aims to provide 50% of the population with water supplies and 50% with sanitation facilities, by 1990.

The most serious constraints to development include institutional weaknesses in appropriate technology and lack of finance.

Egypt

Currency: Pound 0.70 = US$1.00
Population: 48.5 million*
Official language: Arabic
Population growth rate: N/A
GNP per capita: $610*
Life expectancy: 61 years*
Infant mortality per 1,000 births: 93**
Water diseases per 100,000: N/A
Adult literacy (M/F): 59/30
UNDP resident representative: 29 Sh Taha Hussein, PO Box 982, Cairo.

*World Bank 1985
**UNICEF 1985

WATER AND SANITATION AGENCIES:

General Organization for Sewerage & Sanitary Drainage (GOSSD), Tahrir Square, Cairo.
Telex: 93057 GOSSD

General Authority for Drinking Water, Ramsis Street, Cairo.

The Arab Republic of Egypt covers 1,000,250km^2 and is divided into three major regions - the Nile Valley and Delta covering 24,000km^2, surrounded by desert and bounded in the north by the Mediterranean.

Ninety-eight per cent of the population live in the Nile Valley and Delta at an average density of 1,000/km^2. The country is highly urbanised with 46% living in towns. Greater Cairo accounts for a quarter of the population with densities reaching 76,000/km^2. Several new towns are in the process of development. One fifth of the urban and a quarter of the rural population live below the absolute poverty line.

Egypt is divided administratively into 26 governorates, then into districts, towns, quarters and about 4,000 villages. There are 160 city councils and 29,000 settlements below village level.

Life expectancy at birth is 61 years and in 1981 the incidence of waterborne diseases was 16 per 100,000 for typhoid and paratyphoid, 46 for infectious hepatitis and 16 for dysentries (probably under-reported). Schistosomiasis in lower Egypt claims 20% of the general population (1979).

Water resources

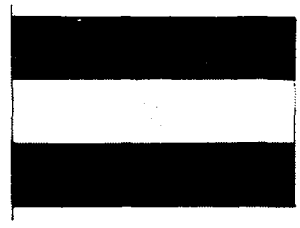
Egypt's main water resource is the river Nile, which is regulated by the Aswan dam. The Western Desert has substantial groundwater resources as yet unexploited. There is virtually no rainfall except along a narrow coastal strip around Alexandria.

By the year 2000 it is estimated that potable water needs will amount to only 5% of the amount available from the Nile and groundwater resources. However increasing agricultural demands have called into question the adequacy of this source. A master plan for the use of Nile waters has been prepared by the World Bank with UNDP financing.

Decade plans

Prior to the Decade, the water and sanitation sector suffered years of neglect. Consequently although high priority is now attached to the Decade, the targets have been put back to the year 2000. After the national launching, a sector workshop, supported by WHO and UNDP, all concerned in this sector put papers forward to update the 1977 WHO/World Bank Sector Study.

The recommendations that arose are being implemented starting with a pilot training programme for most levels of the sector; the foundation of the national authority; and increased decentralisation. The Technical Support Committee has met and a network of collaboration is growing. Egypt's Decade plan has been spread over 20 years because of the magnitude of the problem and the Ministry of Housing and Reconstruction has recently prepared a list of additional projects it would like to see aided in the first phase.



In urban areas in 1981, 88% of the population were served by house connections or had reasonable access to safe water. In rural areas only 64% had reasonable access. Rapid population growth has led to water shortages in city centres and too little or no access in suburban areas. There are many cases of water shut-down and failure to reach high storeys. About 120 lhd is available compared to 140 lhd for other Middle Eastern countries. Water losses, unaccounted for, are estimated to be 40%.

Sanitation facilities lagged behind water with 45% of the 1981 urban population served by sewers. Only five per cent of the rural population had adequate facilities. Sewage flooding appeared due to over-loading and 80% of sewage was discharged into water courses without treatment. Only a small proportion of cities had sewers.

Water quality and effluent is monitored by the Ministry of Health and the National Research Centre is studying water quality as part of a study on the impact of the Aswan dam on the Nile ecosystem. In 1981, a newly-constituted National Organistion for Potable Water and Sanitation was established responsible to the Ministry of Housing and Reconstruction. Greater emphasis will be given to decentralisation to make local authorities responsible for water, sewerage and sanitation projects.

Tariff structures are inadequate to cover maintenance, operating and expansion activities. For example, in 1980, the operating and interest expenses of the Greater Cairo/Helwan Water Authority were two and a half times its total revenues and all expansion costs had to be met by subsidies. The process of making undertakings profit-accountable (that is, after receiving government subsidies) is in hand. The policy is to provide water at a price all can afford. There is no charge made for sewerage services.

El Salvador

Currency: Colon 5 =$1
Population: 5.6M
Official language: Spanish
Population growth rate: 1.9%
GNP per capita: $820
Life expectancy: 66 years
Infant mortality per 1,000 births: 91
Water diseases per 100,000: 10,250
Adult literacy (M/F): 75/69

UNDP resident representative: PO Box 1114, San Salvador

WATER AND SANITATION AGENCIES

Administracion Nacional de Acueductos y Alcantarillados (ANDA), 9a Avenida Sur 2/4, San Salvador.
Telephone: 22 5511

Comité Nacional de Recoursos Hidraulicos,
Apartado Postal 2265,
San Salvador.

Ministerio de Planificación
10 Av Sur y Central Mexico,
San Salvador.

The Republic of El Salvador, with 21,040km^2, is bordered by Guatemala, Honduras and Nicaragua in Central America.

Average annual rainfall amount to 1,182mm, though far higher levels are recorded in mountain areas.

The country's main river is the Tempa which flows through Guatemala and Honduras, but 10,000km^2 of its basin lie in El Salvador. Other main rivers are the San Pedro, Sensunapan and Bandera. Major lakes include El Llopango, Guija, Coatepegue and Olomega. Groundwater resources also exist. Administratively the country is divided in 261 municipalities and 2,061 *cautons*.

Major exports are agricultural: coffee, sugar, shrimps and cotton.

Up to 58% of the country's 5.1M population live in rural areas, where the relative lack of drinking water and sanitation services are reflected in high rates of infant mortality and short life expectancy.

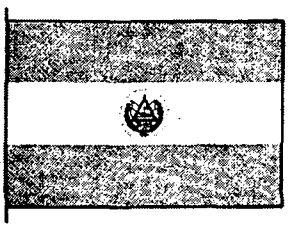
For the past 30 years, however, the Government has been involved in expanding and improving drinking water systems in these areas, with the effect that 1.3M rural inhabitants - 44% of the total - now have direct or easy access to such systems.

This rolling programme was further assisted by a $21M loan which the Inter-American Development Bank approved in 1985 to build water and sewage systems in rural areas.

The loan will help to provide water services to some 230,000 low income residents of small villages and towns and sanitation services to 450,000 people. A subprogramme will install 75,000 latrines to these areas.

The Bank has previously approved two loans totalling $6.2M to aid rural water supply programmes and, in 1987 approved a $10.9M loan for irrigation in the Lempa-Acuhuapa region involving irrigation and drainage for 2,700 ha of land to benefit 800 farmers.

In November 1986, San Salvador was devastated by an earthquake which killed 2,000 people, 10,000 were injured and 250,000 lost their homes. The disaster added further problems to a city already swelling with refugees from a 6 year civil war which has claimed 60,000 lives. Aid, including water tanks, reached the city from the USA and Guatemala.



A National Committee of Institutions for Potable Water and Sanitation (CONIAPOS) has been established to co-ordinate action to meet Decade objectives, including urban house connections to cover 77% of the population by 1990, with 16% covered by standpost. Further aims are for 77% of the population to have sewer connections with 27% connected by other means.

In the rural areas, the Decade plan is aiming to give 75% of the population access to water supply and for 75% to have rural sanitation.

Major constraints in El Salvador, where 39% of the population lack safe water and 46% lack safe sanitation, include a lack of financing and institutional structures and insufficient water resources.

In administrative terms, the Ministerio de Salud Publica is responsible for water supply and sanitation in rural areas; the Ministerio de Plantificacion is responsible for planning, finance and developments within the National Development Plan, the Ministerio de Obras Publicas deals with urban sanitation; the Administracion Nacional de Acueductos y Alcantarillados (ANDA) is responsible for the planning, design, construction and administration of urban water supply systems.

Equatorial Guinea

Currency: CFA Franc 307 = US$1.00
Population: 373,000*
Official language: French
Population growth rate: N/A
GNP per capita: US$180 (1981)**
Life expectancy: 46 years**
Infant mortality per 1,000 births: 129**
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

* World Bank, 1985
** UNICEF, 1986

UNDP resident representative: Calle de Kenia, CP 399 Malabo

Over 26,000km^2 of the total land area of 28,000km^2 of the Republic of Equatorial Guinea are in the province of Rio Muni, situated on the western coast of Africa between Gabon and Cameroon. The remainder of the land area is islands, of which Bioko is the largest (2,000km^2). The capital is Malabo.

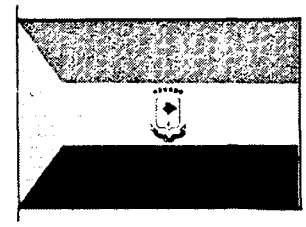
The exact population of the Republic has not been established but estimates indicate that it is about 310,000. The population of Malabo is variously estimated at between 30,000 and 50,000. No official statistics were obtainable in 1980.

Water supply

Daily delivery of water supply to consumers is 1,500,000 litres, giving a per capita supply of between 20 and 50 litres according to population estimates. In addition to demand generated by the population it is necessary to add demand from ships anchored in the port and cooling water for the electricity plant which, when it is working, uses a large volume of water for cooling.

Distribution channels throughout the city are in a very poor state and water losses are huge due to the large numbers of leaks. There is no system of leak detection or of repair.

In order to improve water supply and sanitation the following activities are recommended: source protection; optimisation of springs; study of alternative sources; rehabilitation of supply for the satellite town of Ela Nguema; leak detection, replacement of defective equipment and distribution pipes; improvement of service pressure; installation of hypochlorite disinfection to replace the old system of chlorine gas;



organisation of a regular analysis of water distribution and possible installation of meters. Studies of the possibility of using surface water from the rivers Matadero and Consul are recommended and it is suggested that a study should be made of the possible methods of cooling for the electric power station using a closed circuit system.

Water supply improvement for Malabo requires urgent action. The municipality has neither the means, nor the personnel, material or equipment to confront the problem. International aid is needed if solutions are to be found for the priority problem of providing water for the population.

Sanitation

Liquid waste disposal is by drainage ditch which serves for evacuation of stormwater and also household waste. The drains are in a poor state of repair and there is frequent flooding.

Solid waste disposal is a difficult problem because the city authorities lack the means of supplying even a spasmodic waste disposal service.

Improved environmental sanitation could be achieved with the assistance of two sanitary engineers, four technicians, 30 technical auxiliaries and 60 sanitation representatives.

Entirely based on a report written in May 1980 by a World Health Organisation mission

Ethiopia

Currency: Birr 2.07 = US$1.00
Population: 44.52M (9% urban)
Official language: Amharic
Population growth rate: 2.9%
GNP per capita: US$140
Life expectancy: 46 years
Infant mortality per 1,000 births: 144
Water diseases per 100,000: N/A
Adult literacy: 60%*

**1986*

UNDP resident representative: Menelik II Avenue, PO Box 5580 Addis Ababa

WATER AND SANITATION AGENCIES

Ministry of Mines, Energy & Water Resources, Addis Ababa
Ministry of Health, Addis Ababa
Water Supply & Sewerage Authority, PO Box 5744 Addis Ababa
Telex: 21387
Ministry of Agriculture, Addis Ababa

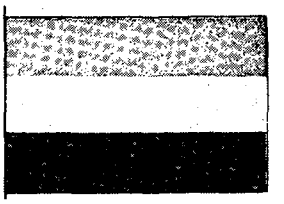
After Nigeria and Egypt, Ethiopia is the most populous African country, and growing at the rate of 2.9% per year. The country covers 1,200,000km^2, classified as quollo (lowlands), awenadegga (semi-lowlands) and degga (highlands). Historically, the highlands have supported 85% of the population, including a large peasant population living in isolated family homesteads.

The drought of 1983-1985 in the Sahel had disastrous consequences in Ethiopia. Increasing human and animal numbers, without any soil conservation measures has meant that for many years in the highlands all the land that can be cultivated, and the hillsides have been almost entirely denuded. The drought tipped this fragile balance of survival in the highlands against the peasant population.

In the emergency of the drought, the government took decisive action to resettle the victims in more fertile and underpopulated parts of the country. By September 1986 about 600,000 people had been moved, 90% of them to the Western Region, comprising the provinces of Kaffa, Wollega, and Illubabor.

Following profound concern from Western aid donors about the social upheavals of resettlement, it is planned to move smaller numbers in better managed operations in future years.

It is estimated that less than 9% of the rural population has access to a safe and adequate water supply (in 1985). However, because the Ten Year Perspective Programme 1984-1994 sees the peasant sector as the motor for the whole economy, enormous investment is being made in rural infrastructure, including water supply and health education.



Another part of the water supply sector which gets considerable government investment is irrigation on the state farms. These cover 4% of agricultural production and are designed to produce cash crops and food for the market-dependent population in the towns, the armed forces, and government.

Few resources have been left over for urban water supply and sanitation. About 69% of the urban population is estimated to have an adequate water supply, mostly from standposts. Urban provision has not kept pace with population growth; in 1980 the level of service was 82%. However, 96% of the urban population is said to be served by sanitary disposal facilities, although there are very few waterborne sewerage systems.

Because of the disruption caused by the 1983-1985 drought, no figures are available for the estimated cost of reaching decade targets, which are now set at providing a safe water supply to 16% of the rural population by 1990.

For urban water supply, it is planned to double the number of individual house connections, but it is not known whether the target 100% urban coverage, envisaged in 1980, has been retained.

The main constraints on achieving targets are the difficulty in getting aid from Western donors, apart from emergency relief and the shortage of skilled manpower.

Community participation figures prominently in the government's policy, and a great push has been made in the rural areas with educational programmes. Over 60% of the rural population is now literate, compared with 8% in 1980. Complete literacy by 1994 is the goal.

However, in the enthusiastic process of building institutions, observers doubt whether scarce manpower resources are being used effectively. In every region there are several parallel management structures - civil administration, Party officials, Planning officials, and Ministry representatives, all in the front line but not in the offices of the capital.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
3,049	- 2,500 -		N/A	N/A	29,151	1,140	236
(1985 Actual)					(1985)		
4,175	431	2,442	307	3,700	40,342	3,567	N/A
(1990 Targets)					(1990)		
5,129	1,000	N/A	N/A	N/A	46,315	7,262	2,778

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	43.5	115.9	24.2	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
30-60	15-20	30-60	15-20

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.48	NO

Fiji

Currency: Dollar 1.3127 = US$1.00
Population: 0.7 million*
Official language: Fijian
Population growth rate: 2.5%*
GNP per capita: US$1,710**
Life expectancy: 65 years**
Infant mortality per 1,000 births: 27***
Water diseases per 100,000: N/A
Adult literacy (M/F): 90/81***

*Population Reference Bureau Inc, Washington DC, 1985.
**World Bank, 1985.
***UNICEF, 1986.

UNDP resident representative: National Bank of Fiji Building, Private Mail Bags, Suva

WATER AND SANITATION AGENCIES

Water & Sewage Section Public Works Department, Ganilau House, Suva
Telephone: 315244
Telex: 2167 FOSE FJ

Health Department, Suva

Finance Department, Suva

Mineral Resources Department, Suva

City and Town Councils

Of the 320 islands in the south-west Pacific comprising Fiji, only about 100 are inhabited. The two largest islands, Viti Levu and Vanua Levu, together cover 87% of the total land area of 18,272km^2. The 1985 population was 0.7 million.

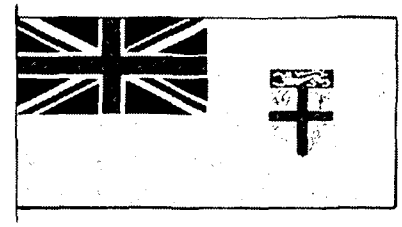
The two main islands are of volcanic origin and are mountainous; the smaller islands are either volcanic or sand on coral. Southeasterly trade winds which prevail from May to October bring heavy rainfall to the south-east coasts.

The majority of external aid is allocated to Decade activities for the rural and under-served population and national sources continue to be concentrated in the towns. Priority is now being given to increasing sanitation coverage by government programmes funded by external sources.

The government is in principal dedicated to a grass-roots approach and in 1984 collaborated with the WHO on three training courses for village workers involved in Decade activities, which was followed by a community participation and education course in 1985.

The Ministry of Health has been designated as the responsible agency for all Decade activities in the rural areas. There is a shortage of staff for project implementation despite a 'Trainer of Trainers' course held with WHO/UNICEF assistance.

Information on the status of water and facilities is limited, but the dissemination of technology to the rural areas is relatively well organised through the



Public Health Institution. Resources from the government are very limited mainly due to relief operations made necessary by recent hurricanes. Most of the Decade resources are from bilateral or international and community sources.

There are insufficient technical personnel adequately qualified and available within the sector to identify and develop Decade projects. However, some assistance is being rendered by the Provincial Public Works Departments and a WHO project in cooperation with the government carries out identification of the problems and promotes the Decade activities.

A national plan for the Water Decade was completed in 1980 and included provision of funds for a feasibility study on the setting up of an autonomous water and sewerage authority to help achieve Decade aims. One of the main aims of the government's plan was to maintain high standards of water supply which were prevalent in 1980 (80% of the population with house connections with water treated to WHO standard was available on a 24-hour basis.)

Finland

Currency: Markka 4.46 = US $1.00
Population: 4,895,000 (70% urban)
Official languages: Finnish and Swedish
Population growth rate: 0.4%
GNP per capita: $10,531
Life expectancy: 74.60 years
Infant mortality per 1,000 births: 6.00
Water diseases per 100,000: 1.6
Adult literacy (M/F): > 95%*

* Figure from Tampere University

WATER AND SANITATION AGENCIES

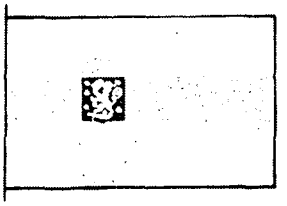
Helsinki Metropolitan Area Water Company, Osoite, Ilmalan tori 1 a E, 00240 Helsinki 24, Finland

Community water supplies in Finland have long been met by using the many thousands of lakes and rivers which characterise the country.

However, during the past 25 years, changes in the previously sparse and comparitively even population densities have altered the situation. The population of southern Finland has grown in an area where the water is least plentiful and as a result the somewhat meagre reserves in this region have been overused and their quality has declined.

By far the most important water supply project in Finland in recent years has been the Paijanne Tunnel which transfers water from Lake Paijanne some 120km to Helsinki and has assured the city's supplies for years to come. The tunnel was completed for the Helsinki Metropolitan Area Water Company in Spring 1982.

One serious pollution control problem in Finland has been caused by the fast-growing pulp paper industry and the government has been forced to impose stringent controls on manufacturers. By 1980, the amount of organic matter discharged into the country's surface waters had been reduced by half in ten years, and by the end of 1985 it was estimated to have been halved again, thanks to expensive wastewater treatment systems.



Decade plan

A Drinking Water Supply & Sanitation Decade Plan was completed in 1981, which established targets for rural water supply and sanitation by 1994/5. Urban populations are well on the way to 100% coverage of water and sanitation by 1990.

By the end of 1984, 1,875,000 of the 1,975,000 rural population had access to safe water with 1,165,000 receiving piped supplies. The target for 1995 is to serve all the rural population with safe water, of whom 1,400,000 will receive piped supplies.

All the rural population were said to be adequately served for sanitation by the end of 1984 with 889,000 out of nearly two million connected to sewers. No further target has so far been set.

Sector responsibilities

All overall planning, finance negotiations, groundwater exploration and water-quality control are the responsibility of the National Board of Waters under the Ministry of Environment.

However, all project planning, design, construction, operation and maintenance are the responsibilities of local administrations in townships and municipalities, aided, where necessary by private consultants and contractors.

Health authorities from the National Board of Health down through regional authorities and municipal boards all have some responsibility for water quality control. Supplies in rural and urban areas are regularly monitored for quality by these bodies.

During 1984, a total of $164M was spent on the water supply and sanitation sector, with $68M going to urban and rural water supplies and $96M spent on urban and rural sanitation.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
2,866	2,592	274	2,537	614	1,898	1,898	1,613
(1985 Actual)					(1985)		
2,935	2,731	167	2,648	244	2,025	1,995	2,012
(1990 Targets)					(1990)		
2,972	2,972	-	N/A	N/A	1,983	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A					

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
300-350	200-250	296	241

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.21	0.39	NO

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	815

France

Currency: Franc 6.10 = US $1.00
Population: 55,173,000 (73.3% urban)
Official language: French
Population growth rate: 0.40%
GNP per capita: US $9,540
Life expectancy: 75.35 years
Infant mortality per 1,000 births: 8.30
Water diseases per 100,000: —
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Ministère de l'Environnement, 14 blvd du Général Leclerc, 92524 Neuilly sur Seine Cedex, France.
Telephone: +33 (1) 47 58 12 12
Telex: 620602

Ministère de l'Agriculture, Service de la Mise en Valeur de l'Hydraulique, 19 avenue du Maine, 75015 Paris, France.
Telephone: +33 (1) 45 44 38 86

Ministère des Affaires Sociales et de l'Emploi, Direction de la Santé, Sous-Direction de la Prévention Générale et de l'Environnement, 124 rue Sadi Carnot, 92170 Vanves, France.
Telephone: +33 (1) 47 65 25 00
Telex: 206355

General responsibility for water management in France is taken by the Environment Ministry, but many other Ministerial departments also have a role.

The basic principle is that all those involved in resource management (flow measurement, water purification, maintenance of low flows, flood warning and pollution control) should be under the responsibility of one ministry: Environment. Any other use may remain the responsibility of another Ministry, for example: Agriculture (irrigation and drainage); Transport (navigation); Health (health standards).

By an Act of 1964, water management is set up within the framework of natural Basins based on watersheds. This division encourages bonds of common interest, which should link members of a particular Basin as well as responding to a desire to decentralise - necessary since regions may not have common problems.

Although provided with the same organisation, the six Basins are autonomously managed under the authority of the Environment Ministry. They each have a Basin Committee composed of elected local representatives, users and governments which acts as a "water parliament".

All users pay a fee based on the quantity of water used or pollution discharged. The common resources thus collected are redistributed as loans or subsidies to local communities and industries which wish to develop water resources or improve their quality.

The basic idea is to set the tax at a sufficiently high level so that it is cheaper for a city or company to provide treatment or purification stations than to pollute the rivers. If they select this option, they receive technical and financial assistance from the appropriate Basin Agency.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
200	200	139.7	125.5

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual)					(1985)		
32,773	32,773	-	N/A	N/A	22,400	22,400	N/A
(1990 Targets) N/A					(1990) N/A		

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	N/A	N/A	1,390	834

Gabon

Currency: CFA franc 307 = US$1.00
Population: 1.2 million*
Official language: French, 40 indigenous languages
Population growth rate: N/A
GNP per capita: $3,670**
Life expectancy: 51 years*
Infant mortality per 1,000 births: 105*

Water diseases per 100,000: N/A
Adult literacy (M/F): 70/53*

*UNICEF, 1986
**World Bank, 1985

UNDP resident representative: Immeuble Nkoussou-Africa No 1, BP 2183, Libreville

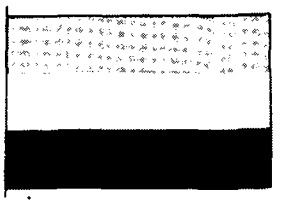
WATER AND SANITATION AGENCIES

Ministère de l'Energie & des Ressources Hydrauliques, BP 1172, Libreville
Telephone: +241 763290, 763299, 763242, 762070

Société d'Energie et d'Eau du Gabon, BP 2187, Libreville
Telephone: +241 761282

Straddling the equator on the west coast of Africa, Gabon covers 272,000km^2, 80% of it forested. Relatively flat at the coast, the relief rises inland to peaks of 1,500m.

Rainfall is abundant (3,000mm on the coast and 1,500mm on the plateaux), and the majority of water courses are perennial.



Administrative structure

The Ministère de l'Energie et des Ressources Hydrauliques is in charge of national planning, financial matters, and tariff structures. Studies and proposals are undertaken by the Direction Générale de l'Eau, the relevant division of the ministry. Production and distribution is the responsibility of the Société d'Energie et d'Eau du Gabon, under the direction of the ministry. The society also carries out resource and feasibility studies.

A tariff structure operates in the towns to cover operating costs, rolling funds, and interest repayments. Schemes in the capital, Libreville, and the second city Port-Gentil are designed to be self-financing. Rural schemes are financed out of a central development budget. External support in the past has come from the Caisse Centrale de Coopération Economique, the European Investment Bank, the African Development Bank, the World Bank, the Canadian International Development Agency and the Development Bank of the Central African States.

Levels of service

Progress in provision of urban water supply has been good, and more than 30,000 households are connected to a public system, 67% in Libreville, 13% in Port-Gentil, and the rest in 26 other centres. By 1990, it is planned to supply another seven centres.

In 1980, it was said that urban water supply took precedence over village schemes. By 1986, 447 villages had been equipped, mostly with handpumps, serving a total of 200,000 people.

Levels of service in the two main cities is not reported, but expected to be better than the 77% coverage provided in other urban centres.

Up-to-date information on sanitation is not available. In 1981, the Service National d'Assainissement had a programme of latrine construction for rural and semi-urban areas, which was reportedly reduced by an economic recession. Libreville had a master plan for sanitation in 1977, and, by 1980, a well established stormwater drainage system and a partial sewage system. Industry was reported to discharge untreated waste into drains. Port-Gentil was reported to be subject to frequent flooding, a potential health hazard as some of the water supply was obtained from shallow groundwater.

Information obtained from *Monographie du secteur de l'eau potable au Gabon*, published in 1987 by Société d'Energie et d'Eau du Gabon.

Gambia

Currency: Dalasi 7.4 = US$1
Population: 749,000 (13% urban)
Official language: English
Population growth rate: 3.4%
GNP per capita: US$241
Life expectancy: 44 years
Infant mortality per 1,000 births: 120
Water disease per 100,000: N/A
Adult literacy: 15% (1980)

UNDP resident representative: Avenue Ann Marie Javouhey, PO Box 553 Banjul.

WATER AND SANITATION AGENCIES

Gambia Utilities Corporation,
PO Box 609 Banjul.
Telex: 2212

Department of Water Resources,
(Rural Water Supply Division),
7 Marine Parade, Banjul.

Ministry of Water Resources & Environment,
Banjul

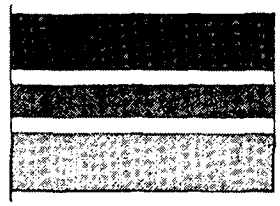
National Water Resources Council & Planning Committee,
Banjul.

Ministry of Works & Communication,
Banjul.

Ministry of Local Government & Lands,
Banjul.

Banjul City Council,
Banjul.

Extending 350km up the Gambia river from the Atlantic coast, Gambia is only 35km wide, covering an area of 11,300km^2. Most (87%) of the three-quarters of a million population is rural, and the economy predominantly agricultural.



National plan

Of the $16M investment envisaged by the four-year plan 1981-1985, the lion's share ($11M) went to rural water supply. About half the rural population had access to safe water in 1985, and reportedly all of the urban population. No figures are available on the level of sanitation services, but a major investment ($37M) in urban sanitation was planned for 1986-1990.

Funding limitations, lack of trained personnel, and insufficient knowledge of water resources are cited as constraints to development. The water tariff meets less than a quarter of the cost ($4.65/m^3) of providing water.

However, there is no shortage of resources, and community participation at all levels of water schemes is said to be 100%.

The country is undertaking a project to provide potable water and reliable electricity to the people of Greater Banjul, the country's capital, and seven urban centres. Backed by a $7M credit approved in 1986 by the International Development Association (the World Bank's soft-loan arm), the project is to be implemented through the Gambia Utilities Corporation. This is the principal institution responsible for the supply of water and electricity for domestic and industrial use.

The $19.4M project will expand existing facilities and provide water to 295,000 people in the Greater Banjul area and another 25,000 in the seven towns: Farafenni, Basse, Georgetown, Bansang, Mansakonko, Kerewan and Barra-Kanuma.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
N/A	30	39	N/A

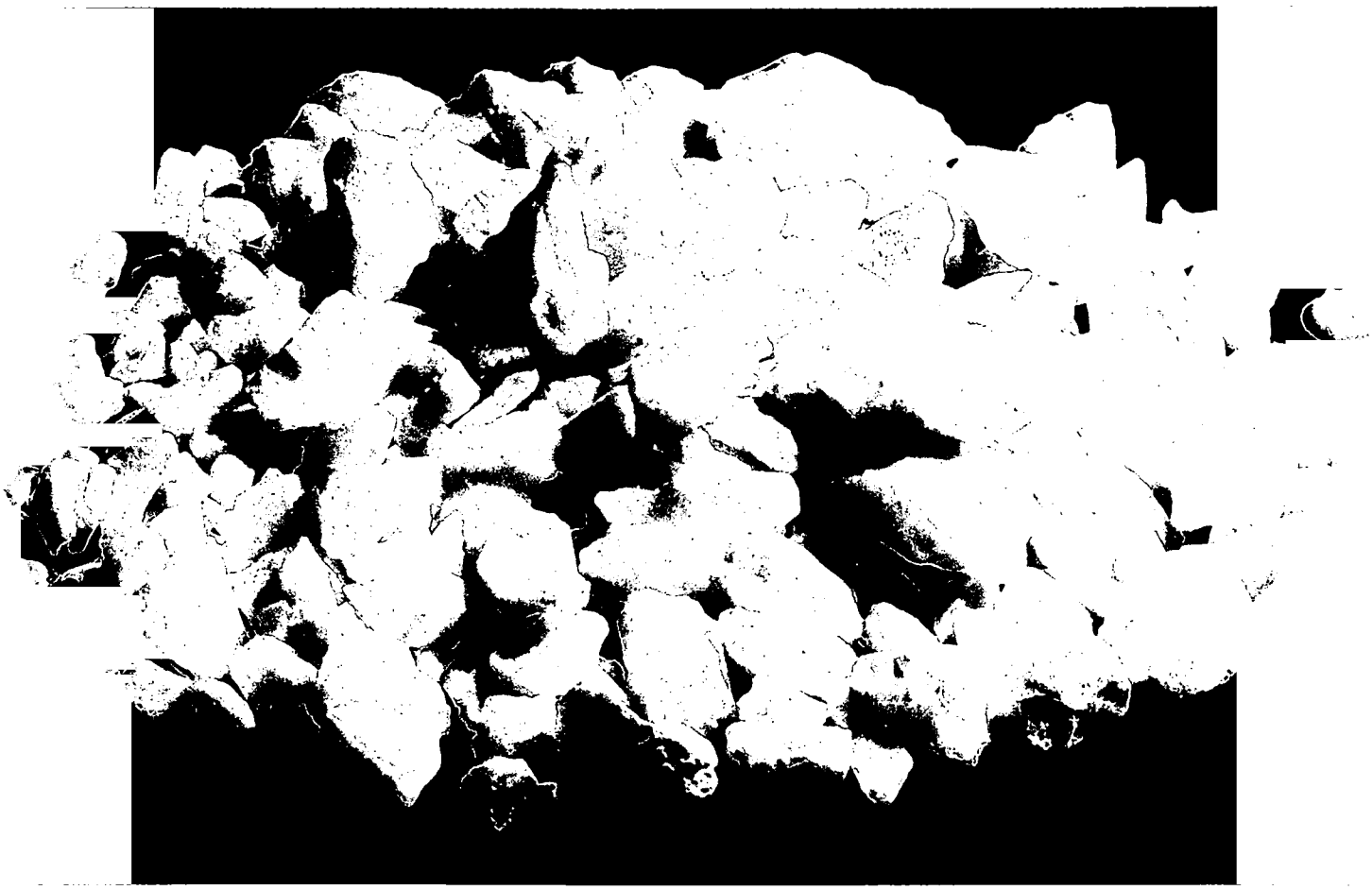
ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 110	94		N/A	N/A	(1980) 491	N/A	N/A
(1985 Actual) 139	135		N/A	N/A	(1985) 610	306	N/A
(1990 Targets)	N/A				(1990)	N/A	

HUNGALU

HUNGARIAN ALUMINIUM CORPORATION

"THE WHOLE RANGE OF THE ALUMINIUM INDUSTRY FROM ONE SOURCE"



granulated

ALUMINIUM SULPHATE

$Al_2/SO_4/_3 \cdot 13.5\text{-}14.5H_2O$

Chemical composition:

Al_2O_3:	17-18%
Basicity:	0.0-0.5%
Fe:	0.005-0.007%
Insoluble residue:	0.04-0.007%
Grain fraction:	0-3mm, 3-8mm, 8-40mm
Packing:	5 ply paper bag + polyetylen bag

Fields of applicaton:
- **WATER PURIFICATION**
- **SEWAGE PURIFICATION**

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German Democratic Republic

Currency: Ostmark 1.83 = US $1.00
Population: 16,640,000 (76.6% urban)
Official language: German
Population growth rate: -0.12%
GNP per capita: $5,437
Life expectancy: 73 years
Infant mortality per 1,000 births: 9.6
Water diseases per 100,000: -
Adult literacy (M/F): 100%*

**Figure provided by national agency.*

WATER AND SANITATION AGENCIES

Ministry for Environmental Protection & Water Management,
Schiffbauerdamm 15, Berlin 1040

In 1985, 29.4% of the population of the German Democratic Republic still lacked satisfactory excreta disposal facilities, defined nationally as connection to public sewers. There are no figures available for how many of these people are served by household systems such as pits privies, septic tanks, or communal toilets.

On the water supply front, however, the situation is considerably better with 92.5% of the population served by house connections, including 2.7 million rural dwellers. Between 100,000 and 200,000 new connections to drinking-water supply are made each year as a result of activities at a community level, particularly in villages.

As can be seen from the table only 64,00 urban people still lack house connections, and the entire population has some sort of reasonable access to safe water.

Estimated per capita consumption in the country has risen from 127 l/c/d in 1980 to 132.7 l/c/d in 1984 and for design purposes is assumed to be rising at 3% per year.

Responsibilities for the water supply and sanitation sectors are highly centralised, with the Ministry of Environmental Protection & Water Resources ultimately responsible for all functions. For overall planning, however, the Ministries of Health, Geology, Agriculture and Industries all have a say.

The Ministry of Health through its State Hygiene Inspectorate has responsibility for maintaining water quality. Routine quality surveillance is undertaken in both urban and rural areas and there is a water supply and sanitation data collection system operated by the Ministry of Environmental Protection & Water Resources.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
N/A		132.7*	

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.14	NO

***Estimated**

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
12,754	11,363*		8,749*		3,986	3,552*	2,735
(1985 Actual)					(1985)		
12,748	12,684	64	9,001*		3,892	3,892	2,784
(1990 Targets)					(1990)		
N/A					N/A		

***1984 combined urban and rural consumption**

German Federal Republic

Currency: Deutsche Mark 1.83 =US$1.00
Population: 61 Million*
Official language: German
Population growth rate: -0.2%**
GNP per capita: 10,940*
Life expectancy: 75 years*
Infant mortality per 1,000 births: 10
Adult literacy: N/A

*World Bank, 1985
**UNICEF, 1985

WATER AND SANITATION AGENCIES

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
(Ministry for Environment, Nature Conservation and Nuclear Safety),
Graurheindorfer Strasse 198,
Postfach 120629, 5300 Bonn 1.
Telephone: +49 (228) 558 2319
Telex: 886896

Bundesverband der Deutschen Gas- und Wasserwirtshaft eV,
Euskirchener Strasse 80, 5300 Bonn 1.

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The Federal Republic of Germany covers a land area of 248,600km^2 with a 1,050km coastline mostly bordering the Atlantic Ocean though some forms the shore of the Baltic Sea.

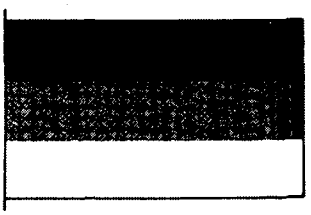
The country has some 4,370km of main rivers that contribute to an estimated annual surface water total of 37,000M.m^3 of which 26,000M.m^3 is usuable. Also available for use is about 16,000M.m^3 of groundwater out of a national total of 27,000M.m^3/year.

These resources are sufficient to meet current demand, but such is the demand for surface water abstraction for industrial use - primarily for cooling water - that existing quantities are almost exhausted. However, only a little over half the available groundwater is being used.

Water supply, wastewater disposal and pollution control are each organised and administered separately. The industries are decentralised and not necessarily coordinated. Achieving coordination or consensus planning is one of the major problems within the German industry.

Securing a water supply for its area is the responsibility of the local authority under the 1976 Water Management Act. This can be done by the authority's own utility or under contract to another water supply undertaking. A permit is required for the use of a particular water system under the federal and individual state laws. These may be recalled.

In 1983, 59.6 million or more than 95% of the West German population was served by a public water supply. These supply systems are required by law to supervise and maintain water



quality, a duty increased by the 1980 directive of the European Economic Community (of which West Germany is a member) defining the quality of water intended for human consumption.

Despite attempts by all federal and state authorities, the cost of water supply differs from region to region due to geographical, hydrological and population differences. It does not necessarily reflect market prices.

Wastewater collection, treatment and disposal are once again the responsibility of local communities; but public systems, if they exist, must be used even if private installations (such as septic tanks) reach an acceptable standard. As with water supply, communities may form associations of different status to share the task of wastewater treatment.

In 1983, 90.9% of the total population had WC facilities connected to the public sewerage network; the remainder used private excreta-disposal systems such as septic tanks.

Nearly 82% of the population used public systems that treated wastewater to secondary standard, while the remaining public systems employed primary treatment. The private systems serving 9.1% of the population used primary or anaerobic treatment. There was no disposal without treatment.

Ghana

Currency: Cedi 162 = US$1
Population: 12,387,000 (32% urban)
Official language: English
Population growth rate: 2.6%
GNP per capita: US$420
Life expectancy: 53 years
Infant mortality per 1,000 births: 120
Water diseases per 100,000: N/A
Adult literacy (M/F): 64/43

UNDP resident representative: Ring Road Dual Carriage, PO Box 1423, Accra.

WATER AND SANITATION AGENCIES

Ghana Water & Sewage Corporation,
PO Box 1840, Accra.
Telex: 2006 WATSEW

Ministry of Health,
Accra.

Ministry of Local Government,
Accra.

Ministry of Works & Housing,
Accra.

Ministry of Finance & Economic Planning,
Accra.

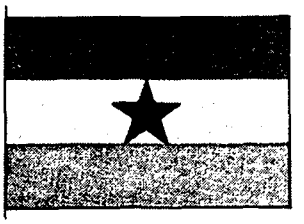
Ministry of Youth & Rural Development,
Accra.

At the beginning of the decade, when the Provisional National Defence Council took power, problems of a stagnant economy and widespread corruption were compounded in the water sector by a serious drought in the West African country of Ghana: a country of 238,537km^2 with a 550km coastline on the Atlantic Ocean. In 1982 there was no measurable rainfall in the river Volta catchment, resulting in severe rationing throughout 1982 and 1983.

Levels of service

In spite of constraints, provision of water in urban areas reached 93% of people in 1985, compared to 72% in 1980 - although the urban population fell marginally in the same period. Rural water supply developed more slowly, serving 32% in 1980 and 39% in 1985. Local People's Defence Committees organised well-digging programmes in 1983, using refugees expelled from Nigeria.

The current 1990 target is to serve towns completely and achieve 77% coverage in rural areas. The urban plan depends on maintaining levels in Lake Volta, which supplies all of the country's conurbations. The previous government strategy of supplying 58% of urban water from standpipes has been retained.



Almost no progress has been made in sanitation. Accra, partly sewered in the 1970s, has not extended the system, relying instead on septic tanks which have increased 25% in number. The industrial towns of Tema and Akosombo are fully sewered, and a plan has been prepared for the northern city of Kumasi. It is planned that by 1990 70% of urban dwellers will have access to some form of sanitary waste disposal.

Rural sanitation has expanded by 11% in the first half of the decade, and is planned to reach 30% of the agricultural community by 1990.

Investment needs

Provisional estimates in 1980 put the costs of meeting decade targets at $340M. No revised estimate is available, but the decade plan is now much more modest than the 1980 version, which aimed at full coverage in water supply and sanitation throughout the country, for a population which was expected to be larger by 1.6 million than the 14.2 million now predicted.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 4,164	1,100	1,915	160	1,780	(1980) 7,409	2,439	1,226
(1985 Actual) 3,956	1,626	2,053	160	2,234	(1985) 8,431	3,314	1,363
(1990 Targets) 4,631	1,945	2,686	162	3,080	(1990) 9,606	7,413	2,882

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

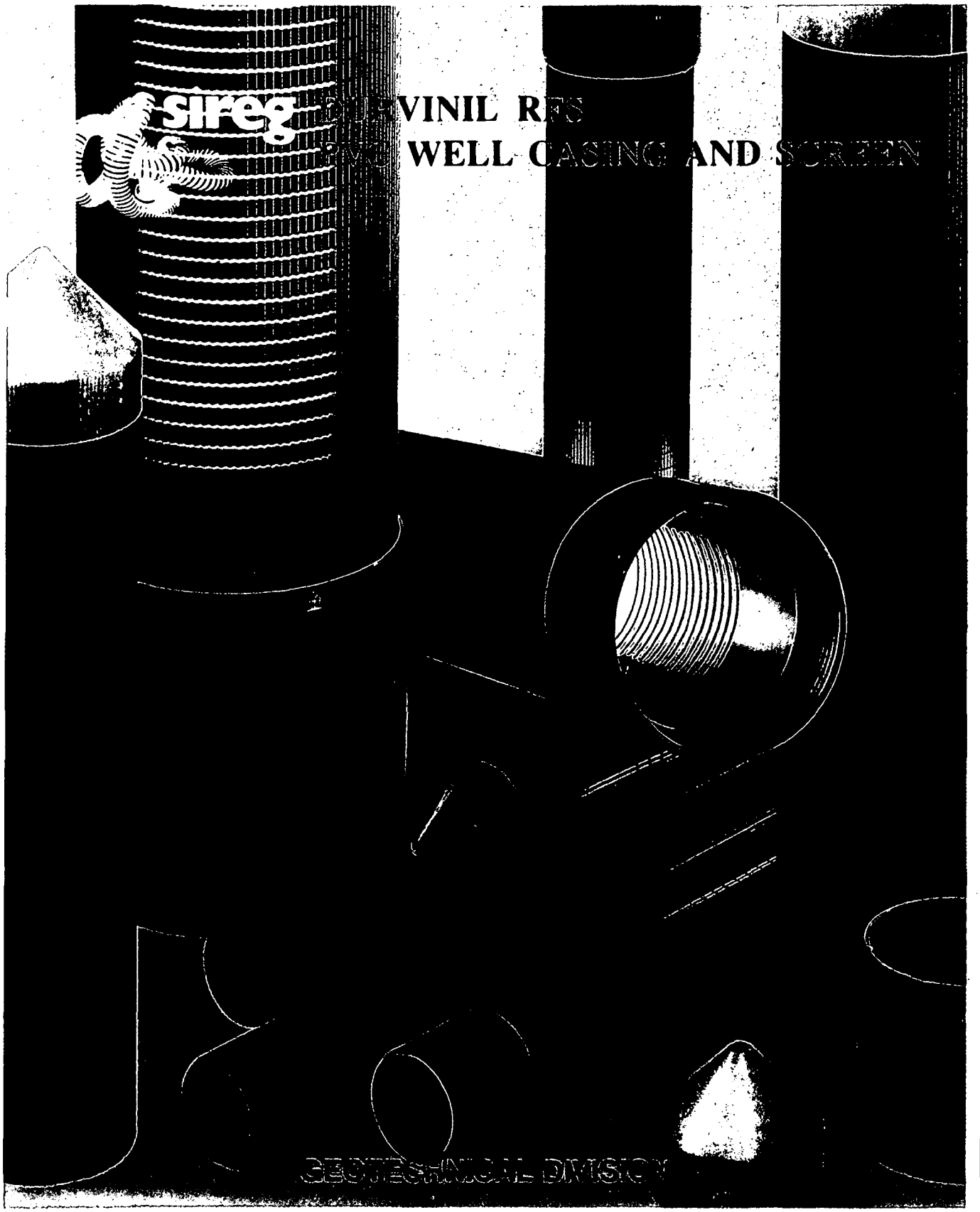
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
100	80	200	60	30	100

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
100	22.7	45	5

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.35	0.35	YES



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Greece

Currency: Drachma 135 = US $1.00
Population: 10,168,000 (70% urban)
Official language: Greek
Population growth rate: 1.1%
GNP per capita: US $3,550
Life expectancy: 74 years
Infant mortality per 1,000 births: 14
Water diseases per 100,000: N/A
Adult literacy (M/F): 97/88

WATER AND SANITATION AGENCIES

Ministry of Health & Welfare, 17 Aristotelous St, 10187 Athens, Greece.
Telephone: +30 (1) 322 9352
Telex: 218396 YKYP GR

EYDAP, 1 Kornarou St, 10563 Athens, Greece.
Telephone: +30 (1) 322 9352
Telex: 219353 EAUX GR

The Greek archipelago covers a total surface area of 132,000km^2 in the Mediterranean, Aegean and Ionian seas.

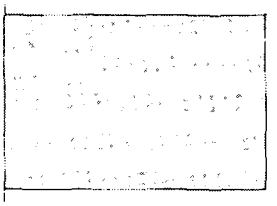
Overall planning in the water supply and sanitation sectors is the responsibility of the Ministry of Environment, Housing & Public Works, while the Ministry of Energy & Natural Resources is responsible for groundwater exploration.

Detailed planning, design and construction of water supply and sanitation in urban areas is also the responsibility of the Environment Ministry. Rural water supply and sanitation planning and design, however, come under the Department of the Interior.

The Athens area has its own water supply and sewerage authority, EYDAP, while rural water supply construction operation and maintenance comes under another authority, the Communal Enterprise for Water Supply and Sewerage, DEYA.

Water quality control is the responsibility of the Ministry of Public Health, Welfare & Social Security (Directorate of Hygiene) and also, in the Athens area, EYDAP. The Ministry of Health's Directorate of Hygiene does carry out checks in other towns in a non-systematic and sporadic fashion.

A National Action Committee has been formed within the framework of the IDWSSD, but its function is purely advisory and it has no powers to establish programmes or commit resources. It meets every six months.



But currently there is no data collection and information system for water supply and sanitation and no quality surveillance of water supplies on a routine basis, except by EYDAP in Athens.

A number of important cities, such as Larissa, Kavalla, Serres, and Chalkis, have to some extent sewerage systems and treatment and disposal facilities; these serve a total of 3,396,000 people. Completion of the Athens sewage treatment plant at Psitallia will raise the percentage of the sewered population whose sewage is treated from 21% to 72%. This will, however, only provide primary treatment initially. Only 17% of the population with a sewered system benefit from primary and secondary treatment.

Construction of sewerage networks is carried out by the decentralised authorities and has made considerable progress in recent years. The Ministry of Public Works estimates the percentage of the population served by a sewerage system to be 60-65%, but statistical records on sewerage systems do not exist.

Grenada

Currency: East Caribbean Dollar 2.7 = US$1.00
Population: 96,000**
Official language: English
Population growth rate: -0.8%
GNP per capita: $970**
Life expectancy: 68 years**
Infant mortality per 1,000 births: 14*
Water diseases per 100,000: N/A
Adult literacy (M/F): 51/49*

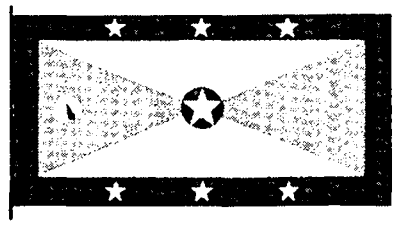
*UNICEF, 1986
**World Bank, 1985

One of the Windward Islands, Grenada covers 344km^2 and has a population of 96,000 (1985). Another 500,000 Grenadians are expatriate.

With green hills and fast-flowing streams, the three islands of Grenada, Carriacou, and Petit Martinique are not short of water. However, no figures are available on service coverage.

Grenada has always been successful in attracting foreign aid, even under the Marxist People's Revolutionary Government deposed by US intervention in October 1983. With funding from the Caribbean Development Bank, the then Central Water Commission built a 140m^3/day scheme for La Mode and Boca, schemes for Peggy's Whim and Mama Cannes in St Andrew's parish, and replacement of mains in the capital St George's. Community labour contributed to these schemes.

Since 1983, the New National Party government has received a boost in foreign aid for capital schemes, most of it from the US Agency for International Development. This donor's contribution to all sectors rose from nil in 1983 to $11.5M in 1984, and $17.7M in 1985. It largely replaced aid from Cuba which



stood at $14.8M in 1983.

However, US funding is set to decline progressively over the next few years, and the government is attempting to revive the two most important sectors of the economy - agriculture and tourism.

WATER AND SANITATION AGENCIES

Ministry of Works, Communications, Public Utilities, Civil Aviation & Energy, St Georges

Ministry of Agriculture, Forestry, Land, Fisheries & Tourism, St Georges

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Guatemala

Currency: Quetzal 1 =$1
Population: 8 million
Official language: Spanish
Population growth rate: 2.9%
GNP per capita: $1,250
Life expectancy: 60 years
Infant mortality per 1,000 births: 109
Water diseases per 100,000: 671
Adult literacy (M/F): 63/47
UNDP resident representative: Apartado Postal 23-A, Cuidad de Guatemala

WATER AND SANITATION AGENCIES

Instituto de Fomento Municipal (INFOM),
8a Calle 1-66, Zona 9,
Guatemala City.

Direccion General de Obras Publicas (DGOP),
7a Avenida 14-57, Zona 13,
Guatemala City.

Ministerio de Salud Publica Y Asistencia Social,
2a Avenida 0-61, Zona 10,
Guatemala City.

The Republic of Guatemala has a south-central mountainous region with rolling hills to the north, and plains in the southern part of the country.

In the central mountains, average annual rainfall ranges from 1,200mm to 1,800mm, in the plains, it ranges from 400mm to 600mm, and in the coastal regions, precipitation varies between 4,000mm and 5,000mm. The rainy season in the centre is from May to October with a longer wet season in the north.

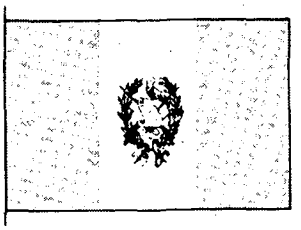
There are 18 rivers spilling into the Pacific, though they are short and run swiftly; the 16 rivers flowing to the Atlantic are wider and slower running. There are 6 fresh water lakes and 136 lagoons. The country is divided in 327 municipalities.

Main export earners are agricultural products like bananas, coffee and sugar, supplemented by textiles, some industrial products and petroleum exploitation. There is a road network of 14,000km and 766km of rail track.

Some 42% of the total population are without safe water, while 46% lack safe sanitation.

In 1985, 1.9 million of the 3 million population, that is 63%, had access to water supplies via house connections, while 796,000 or 26% of the urban population were supplied by standpost.

In the rural areas, in the same year, 1.9M or 39% of the agrarian population had access to water supplies. In terms of



sanitation, 50% of the urban population had been provided with sewerage connections. The corresponding figure in the rural areas was 42%.

In October 1986 the World Bank approved a $23M loan for a water supply rehabilitation project, regarded as the first step in assisting the Empresa Municipal de Agua (EMPAGUA) to become a more efficient organisation. The organisation is the water supply agency for Guatemala City, the capital.

Increased water supply is expected to benefit 700,000 people, through the provision of 100,000 new service connections, at least 75% of these new beneficiaries have incomes below the urban poverty threshold of $430 per capita per year.

In February 1987, the Instituto de Fomento Municipal, the agency responsible for urban water supply outside the capital, announced it was retaining a US consultancy firm to prepare a national planning study of water supply and waterwater needs for the country's 328 secondary cities. The study will recommend an investment programme which will form the basis of the governments efforts to provide these facilities over the next 10-15 years.

By 1990, the Decade aim is to provide water supplies through house connections to 75% of the population, and for 19% to be covered by standpost. Decade targets, in terms of the rural areas, aim to lower 60% of the population with water supplies.

With regard to sanitation, 57% of urban households should be provided with sewer connections and 36% by other means; 60% of the rural population should be provided with adequate sanitation.

In the rural areas, the Division de Saneamiento Ambiental and the Unidad Ejecutora de Programas de Acueductos Rurales and the Dirección de Desarrollo de la Comunidad - divisions of the Health Ministry - are responsible for water services.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
2,690	1,377	1,026	945	270	4,570	828	920
(1985 Actual)					(1985)		
3,046.5	1,927.8	796.2	1,522.3	708.5	4,916.8	1,902.6	2,050.3
(1990 Targets)					(1990)		
3,676.3	2,740.7	682.9	2,108.1	1315.5	5,521	3,312.6	3,312.6

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
160	44.0	100.0	80.0	34-75	15

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
150-225	40-100	150-225	40-100

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.11	NO

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	599
Investment totals (US $ millions 81-85)	16.2

Guinea

Currency: Franc 340 = US$1
Population: 5,780,000 (27% urban)
Official languages: French, Basari, Fulani, Kissi, Koniagi, Kpelle, Loma, Susu, Malinke
Population growth rate: 2.3%
GNP per capita: US$310
Life expectancy: 49 years
Infant mortality per 1,000 births: 160
Water diseases per 100,000: N/A
Adult literacy (M/F): 40/17

UNDP resident representative: Immeuble Ex-Urbaine et Seine, BP 222, Conakry.

WATER AND SANITATION AGENCIES

Service National de l'Hydraulique,
BP 642 Conakry.

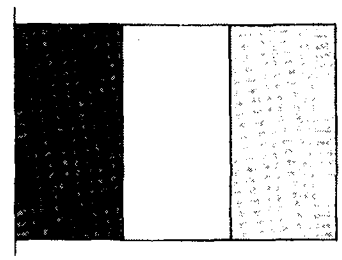
With a land area of 250,000km^2, Guinea, on the west coast of Africa has variable rainfall - from 4,500mm a year in the Maritime and Dubreka regions to less than 1,000mm in Koundara.

The urban population has already reached the 1990 prediction of 1.58 million made in 1980. Though 1985 figures are available, the 1990 target populations and levels of service given in the table are those set in 1980.

Levels of service

About 41% of townspeople have access to a safe water supply, compared to the 1980 aim of supplying 77%. The 1990 level of private connections has already been reached while standpipe provision has fallen behind. There are no data on new construction of septic tanks and latrines in towns, but the number of sewered connections is unchanged from 1980, suggesting that urban sanitation serves about the same proportion of inhabitants (54%) than it did in 1980.

For the rural population there has been a significant improvement in access to safe water, with 12% now provided for compared to only 2% in 1980. The 1990 target is 22%, which will be met if current rates of progress are maintained. There are no data on rural sanitation, suggesting that the 1980 figure of 1% of the population with adequate facilities persists.



Responsible agencies

Planning responsibility falls to three ministries: Plan, FAPA (Fermes Agro-Pastorales d'Arrondissement) and Town Planning & Housing, while every ministry can be involved in loan negotiations.

FAPA is responsible for groundwater exploration and water quality is shared between the Ministries of Energy, FAPA, and Health. Energy and Town Planning share the range of duties in providing urban water supply, while Plan and FAPA take care of rural water supply. Urban sanitation responsibilities are shared between FAPA, Health and Town Planning.

In 1980 there were estimated to be 275 trained people in the sector, with no provision for training more. No information is available on current staffing levels.

Investment needs

There are no up-to-date figures on investment needs, but 1980 estimates showed $35M would be needed for urban water supply, and $20M for rural, in the period 1981-1985. An additional $25M was expected to be needed for urban sanitation. Rural water supply in the period 1986-1990 needed $35M. In 1980, 10% of the urban population were regarded as poor city dwellers in urgent need.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 1,104	180	589	145	455	(1980) 3,913	90	40
(1985 Actual) 1,579	410	232	145	—	(1985) 4,201	514	—
(1990 Targets) 1,580	420	790	250	610	(1990) 4,995	1,080	—

Guinea Bissau

Currency: Pesos 650 = US$1.00
Population: 880,000 (27% urban)
Official language: Portuguese
Population growth rate: 2.2%
GNP per capita: US$150
Life expectancy: 40 years
Infant mortality per 1,000 births: 200
Water diseases per 100,000: 3500
Adult literacy (M/F): 46/17

UNDP resident representative: Avenida Domingos Ramos 34-E, CP 179 Bissau.

WATER AND SANITATION AGENCIES

Ministerio de Obras Publicas, Construcão e Urbanismo, CP 211 Bissau.
Telex: 96900

Ministerio de Recursos Naturais, Bissau.

Ministerio da Administração Interna, Bissau.

Secretaria de Estado Planejamento e da Cooperação Internacional, Bissau.

Ministerio do Desenvolvimento Rural, Bissau

Ministerio da Saúde e Assuntos Sociais, Bissau.

Situated on the west coast of Africa, Guinea-Bissau has a land area of 36,125km^2. The 1985 population was 880,000, of whom 690,000 (78%) were living in rural areas. The urban population is expected to reach 229,000 by 1990, an increase of 20% on the 1985 figure; in the country the increase will probably be less than 9%, resulting in a national population of 981,000 by the end of the Decade.

Reported waterborne and water-related diseases in 1985 affected 3,500 out of 100,000 people, an improvement of only 0.4% on the 1980 statistic (3,880 per 100,000).

Planning targets

In water supply, urban and rural, less than half the planned 1986 level of service had been achieved by 1985, a fact reflected in the lower target predictions for 1990.

The next planning period, which begins in 1986, provides for house connections for 36,000 or 16% of urban dwellers by 1990, with another 12,000 (5%) to be supplied from urban standposts. A third (260,000) of the rural population should have a safe water supply by 1990.

In the urban areas, provision of water-borne sewerage connections has been running at about 10% of the level of house water-supply connections. Between 1980 and 1985, 300 more people were connected to sewers, compared with a projection for 1986 of 1,300.

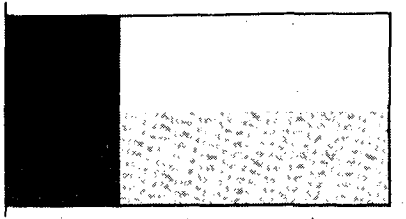
However, construction of other forms of sanitation facility (septic tanks and privies) has been accelerated. In the period 1980-85, another 21,000 people in the towns were provided with some form of sanitary facility. By 1990, it is planned that 65,000 people (28%) in the towns will have sanitation.

In rural areas, sanitation programmes have been running ahead of schedule: by 1985, the 1986 target for sanitation had already been exceeded by a good margin - 27,000 more people than planned had access to safe facilities. By 1990, 24% of the rural population (180,000 people) should have adequate sanitation.

Agency responsibility

General planning is done by the Ministries of Natural Resources and Planning. The Planning Secretariat negotiates loans, and also has responsibility for international cooperation.

Groundwater exploration is carried out by four ministries: Natural Resources, Internal Administration, Energy, and Rural Development.



Water quality is controlled by the Natural Resources and Health Ministries.

In urban areas, the Natural Resources Ministry and the Public Works Ministry both undertake water supply, but the operation and maintenance functions for Public Works schemes also involve the Ministries of Internal Administration and Energy.

Rural water supply falls to Natural Resources, with some involvement in operation and maintenance from Internal Administration.

Urban sanitation is under Internal Administration and Public Works, but in rural areas sanitation responsibility is shared between Natural Resources and Health.

In 1980, there were 355 qualified personnel at all levels working in the sector - 277 of them technicians or artisans. By 1985, the staff had increased to 551, although the number of technicians remains unchanged, suggesting recent appointments at higher levels.

Providing a water supply costs $160 in the city (house connections) and $110 in the country. Urban sewer connections cost $300, and septic tanks about $60. There are no accurate figures available for the investment needed to achieve Decade targets.

Development constraints

At the beginning of the Decade it was reported that lack of finance, lack of qualified personnel, inefficient operation and maintenance, logistics problems, and import restrictions hampered development.

There is no new information to substantiate that assessment, except the levels of participation of rural communities in improvements. Community participation remains high at the planning stage (90% in 1985 compared with 87% in 1980), but has dropped from 64% to 55% in construction of new schemes, and significantly from 72% to 30% in operation and maintenance.

The public health campaign on water supply and sanitation still has a high profile, and women's participation is actively promoted.

Guyana

Currency: Dollar 10 = US$1.00
Population: 817,000
Official language: English
Population growth rate: 1.1%
GNP per capita: $590
Life expectancy: 69 years
Infant mortality per 1,000 births: 40.6
Water diseases per 100,000: 634
Adult literacy (M/F): 97/95

UNDP resident representative: PO Box 10960, Georgetown

WATER AND SANITATION AGENCIES

Guyana Water Authority (GUYWA), Sophia, Greater Georgetown

Ministry of Public Utilities, c/o Ministry of National Development, Sophia, Greater Georgetown

The only English-speaking territory in South America, Guyana is associated culturally and economically with the islands of the Caribbean.

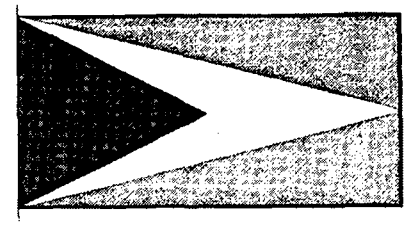
The 817,000 population is concentrated on the relatively narrow coastal strip, which is crossed by three huge rivers, the Essequibo, the Berbice and the Demerara, as well as many smaller ones. Much of this plain, some 30km wide on average, is actually below tidal level and is poldered in the Dutch fashion, requiring protection at all times from the ocean.

Within the tropical climate, temperatures range between 22°C and 32°C near the coast and 15°C and 39°C inland. Rainfall averages 2,000-2,600mm annually and the rainy seasons are April-July and November-January.

National situation

The government, re-elected in December 1985, has formidable problems to face. The country has a heavy external debt and is in arrears on almost all repayments. Profits in all three major productive sectors - sugar, bauxite and rice - are down. Foreign exchange is scarce and becoming scarcer. Water and electricity systems are at breaking point and health care has deteriorated badly, according to the European Community, which is providing assistance.

In 1980, approximately 247,000 people or 30% of the population live in urban areas. The fact that the 1985 figure has leapt to 401,000 or 49% is



probably more due to a change in the statistical parameters than a shift in population.

Water supply

Guyana has abundant water resources. The majority of the population could have reasonable access to water if services were reliable in quality and quantity. Distribution systems with house connections exist in cities and towns, serving over 90% of the urban population, but in rural areas groundwater extracted from wells is the major resource and 35% of the population still lack a safe water supply. Treated surface water is used in Georgetown, Linden and Bartica and untreated surface water in many inland communities.

Coverage is less extensive for sewerage systems - only 17% coverage in urban areas - and the situation is made worse by insufficient maintenance and ageing installations.

Sector responsibilities

The Ministry of Health & Public Welfare provides overall direction to the water and sanitation programmes in Guyana. The Guyana Water Authority (GUYWA) administers over 120 water supply systems mostly in rural areas.

More than 20 other water systems are managed by the Sugar Industry Welfare Fund Committee. The consumers in these areas are scheduled for takeover by GUYWA.

The Georgetown Sewerage & Water Commission (GSWC) provide water and sewerage services in the Georgetown area subject to budgetary control by the city administration.

In addition, environmental health officers work in both urban and rural areas to identify and correct environmental health problems. In 1982, 4,623

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
247	222	25	67	180	578	347	462
(1985 Actual)					(1985)		
401	365	36	67	334	416	270	333
(1990 Targets)					(1990)		
412	412	—	70	330	428	407	407

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
120	100	1000	200	120	100

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	21.2
Investment totals (US $ millions 81-85)	12.68

Guyana (continued)

cases of gastroenteritis were reported in children up to 4 years old with another 690 cases among children above that age. Infectious hepatitis affected another 227, with salmonellosis (59) and typhoid fever (71) also prominent.

Current project

The Inter-American Development Bank announced in November 1986 approval of a $360,000 technical cooperation grant to strengthen potable water and sanitation institutions.

The project will be executed by GUYWA with the help of consultants who will provide advice on improving the administrative, financial, accounting and operational capacity of the public institutions operating in the sector. These will include GUYWA itself, ten regional administrations and the GSWC.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
400	400	240	180

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.08	0.03	Some areas

Haiti

Currency: Gourde5 = $1
Population: 6.6 million
Official language: French
Population growth rate: 1.4%
GNP per capita: $320
Life expectancy: 54 years
Infant mortality per 1,000 births: 180
Water diseases per 100,000: 50,000
Adult literacy (M/F): 40/35
UNDP resident representative:
Boite Postale 557, Port-au-Prince

WATER AND SANITATION AGENCIES

Service National d'Eau Potable, Delmas 45
Telephone: 6-2927 or 2955

Central Autonome Metropolitaine d'Eau Potable (CAMEP), Avenue Paul VI 104, BP 1012, Port-au-Prince
Telephone: 2-6579 or 5340

The Republic of Haiti in the West Indies has a tropical climate modified by altitude. Agriculture is the basis of the economy, with coffee accounting for 45% of exports. The island possesses unexploited mineral resources, but there is a well developed road network and international shipping services.

In 1985, 62% of the total population were without safe water supplies and 79% were denied sanitary facilities. Some 32% of the urban population were supplied with drinking water by house connection and 27% by standposts. There were however, no sewer connections in urban areas, but 42% were serviced by other means.

In the same year, 30% of the rural population had water supplies; only 13% had access to adequate sanitation.

Decade targets include: providing 60% of the rural population with water supplies and 60% to have sanitation, by 1990. In terms of urban supply, the Decade aims to service 80% of the population by 1990.

A loan of $4.2M approved by the Inter-American Development Bank in November 1986 will help boost the country's rural water supply programme. About 106,000 people are to be provided with potable water.

In addition the World Bank, through its soft-loan affiliate was proposing in June 1987 to lend $24M to the country for development of the Port-au-Prince water supply, including new sources and installation of networks and connections. The project will be administered by the Centrale Autonome Metropolitaine d'Eau Potable (CAMEP).

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
145	48	200	25	36	15

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,300	288	271	N/A	N/A	3,700	20	N/A
(1985 Actual)					(1985)		
1,405	447	379	0	592	3,864	1,166	515
(1990 Targets)					(1990)		
1,713	N/A	N/A	N/A	N/A	4,061	2,450	2,450

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
100	30	55	20

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.18	0.28-1	YES

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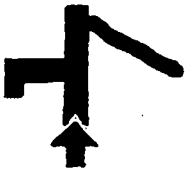

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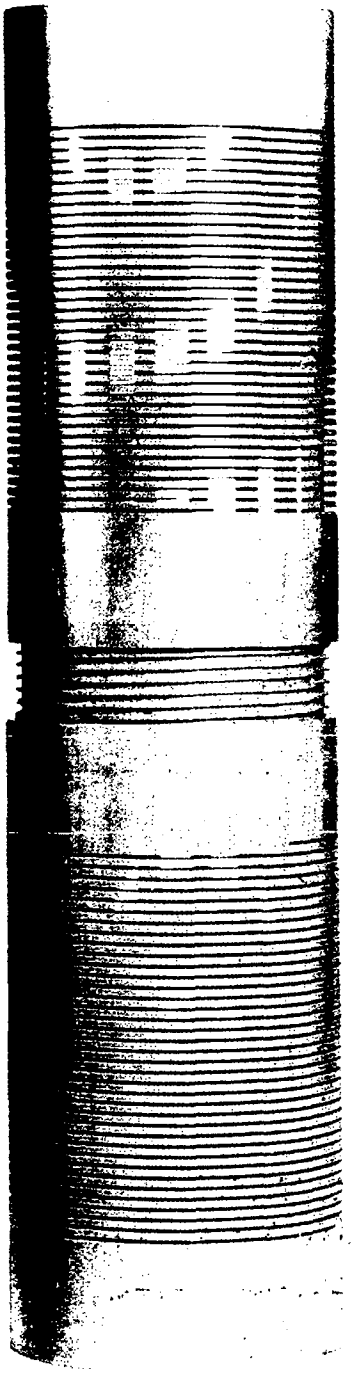

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Honduras

Currency: Lempira 2 = US$1.00
Population: 4.4M
Official language: Spanish
Population growth rate: 3.4%
GNP per capita: $720
Life expectancy: 62 years
Infant mortality per 1,000 births: 80
Water diseases per 100,000: 4,462
Adult literacy (M/F): 61/58

UNDP resident representative: UNDP, Edificio Commercial Maya, Apartado Postal 976, Tegucigalpa, Honduras

WATER AND SANITATION AGENCIES

Servicio Autonomo Nacional de Acueductos y Alcantarillados (SANAA) (National Autonomous Service for Water & Sewerage)

Ministerio de Gobernacion y Justicia (Ministry of Government and Justice)

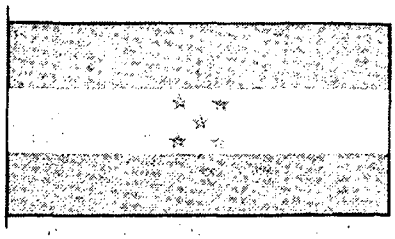
Mountainous Honduras, a republic located in the Central American isthmus, has a total land area of 112,088km^2. Some peaks reach 2,700m and access is difficult although fertile alluvial valleys have been formed by the main rivers which flow northeastwards to the Gulf of Honduras.

The altitude of the main regions determines the climate. The north coast lowlands are warm and wet with temperatures of around 27°C and up to 3,000mm of rainfall in an average year, while inland mountain areas are drier and cooler, and parts of the central district may have as little as 300mm of rain. Most rain falls between May and November and inland areas are brown and parched during the dry season.

Decade plan

The government, with technical help from the World Health Organisation and financial assistance from the West German agency GTZ, has prepared a National Plan for Drinking Water and Sanitation for the period 1983-1990. In November 1983, the President created a National Committee for Drinking Water and Sanitation (CONAPS) to coordinate activities for achievement of the Plan, and to take responsibility for presentation of yearly general reports on the sector.

The Committee involves: The Director of Environmental Sanitation of the Ministry of Public Health (Sanitation and Drinking Water Division); The Director of Social Planning from the Technical Secretariat for Advice on Economic Planning (CONSUPLANE) which acts as Secretariat; the head of Servicio Autonomo Nacional de



Acueductos y Alcantarillados - National Autonomous Service for Water and Wastewater (SANAA); the president of the Banco Municipal Autonomo; and the director of AATM (Asesoria y Asistencia Technica Municipal) of the Ministry of Government and Justice. They may nominate representatives to attend Committee meetings.

In order to monitor work on achievement of the Plan, the responsibilities of different agencies involved have been clarified. The Ministry of Public Health works in five areas:

1. Construction of small rural water schemes and supervision of the operation and maintenance;
2. Construction of communal wells in rural areas, and supervision of operation and maintenance;
3. Construction, installation and control of maintenance of latrines in rural areas and in urban areas where there is no sanitary sewerage;
4. Health education; and
5. Control of water quality

Rural programme

A Rural Water and Sanitation programme, Programa de Agua y Saneamineto Rural (PRASAR) financed by the US Agency for International Development is being carried out in conjunction with SANAA. As part of this programme, the Ministry of Public Health is carrying out works for communities of between 50 and 500 people. Work involves: 20,800 latrines; 54,000 village water systems; 2,000 community wells equipped with hand pumps; 15 community wells pumped by windmills; 25 gravity systems and a programme of health education which also covers areas where water/sanitation schemes are being built by SANAA.

In each community, an honorary health representative who will lead a small administrative team is identified. They are supervised by health promoters who work from 462 Rural Health Centres (CESAR) located in 283 municipalities. These in turn are monitored by coordinators of health promoters, working from 29 Centres of Medical Health (CESANO) or Area Hospital Centres. The next tier is administered through engineers and coordinators in eight health regions;

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,563	719	63	N/A	94	2,530	1,012	658
(1985 Actual)					(1985)		
1,737	546	258	331	17	2,635	1,186	899
(1990 Targets)					(1990)		
2,237	2,013	0.0	1,678	67	2,868	2,581	2,294

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
319	N/A	146	N/A	53	18

Honduras (continued)

and the final tier is the Division of Sanitation and Drinking Water (Saneamineto y Agua Potable) under the Basic Programmes Directorate of the Director General.

Information needed to monitor sector activities under the Plan starts with the community and is passed through the health promoters to the area coordinators then to the engineering coordinator for the region and finally to the Division of Sanitation and Drinking Water.

Under the Action Plan for Health for All by the Year 2000, the Ministry of Public Health has an extensive network which covers almost the whole country. It has accumulated a considerable amount of useful information, for example, details of populations served by communal wells.

All the activities of SANAA are associated with the sector. It is concerned with the design, construction and operation of potable water and sanitation systems for rural areas, urban areas, and for the metropolitan area of Tegucigalpa.

SANAA participation in the PRASAR programme involves: 355 gravity fed water systems to supply domestic connections, improvement of 150 existing systems; 6 primary sewage treatment plants; installation of 20,000 improved latrines in areas where the water supply has been upgraded; survey of all water supply schemes in the country; and a plan for training.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	491
Investment totals (US $ millions 81-85)	44.4

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
150	75	150	80

Other SANAA joint programmes are SANAA-CARE (house connections for groups of between 200 and 2,000 inhabitants) and SANAA-BID (a rural programme financed by the World Bank).

A special department of SANAA (Operacion y Mantenimiento del Distrito Metropolitano) operates water and sewage systems in Tegucigalpa and designs and constructs extensions to the network.

The Masterplan for the Metropolitan District - Plan Maestro del Distrito Metropolitano - determines major works and executes projects once finance has been agreed.

SANAA is also involved in five special subprogrammes for water: PARZOS, using funds from central government has been set up for rural water supplies in the southern region following floods; PRODERO (Programa de Desarrollo de la Region Occidental), a general development programme under the Ministry of Natural Resources which has a special subprogramme for rural water supply; SANAA-Ministerio de la Presidencia covers water supply in the central zones and is executed by SANAA with central government funds; and a subprogramme for Barrios Marginales de Distrito Central is funded by SANAA.

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.20	0.26	YES

The 126 municipalities which administer and operate their own water and sanitation systems come under the general jurisdiction of the Ministry of San Pedro Sula which has created its own Division Municipal de Aguas (DIMA) to operate potable water and sewage systems. Because of the size and importance of San Pedro Sula, DIMA is able to bypass the Ministry of Government and Justice and reports directly to CONAPS.

The Banco Municipal Autonomo (BANMA) finances different municipal services, including water and sewerage, mostly for urban areas. It is able to provide up to 90% of the cost of a project with repayments spread between 10 and 20 years.

The ultimate objective of the Plan and the agencies involved in its execution, is to provide reasonable access to safe water for 2.5 million out of an anticipated 2.8 million rural people by the year 2000; and to provide house connection to 2 million among an anticipated urban population of 2.2 million. An ambitious sanitation programme would increase rural sanitation from 899,000 served to 2.2 million and urban sewerage from 331,000 to 1.67 million. It is estimated that $491M would be required to reach these targets.

Hong Kong

Currency: Dollar 7.805 = US$1.00
Population: 5.2 million*
Official language: English & Cantonese
Population growth rate: 1.0%*
GNP per capita: US$5,100
Life expectancy: 76*
Infant mortality per 1,000 births: 9.9*
Water diseases per 100,000: 54 (1984)
Adult literacy rate (M/F): 95/81

*Population Reference Bureau Inc, USA, 1985

WATER AND SANITATION AGENCIES

Civil Engineering Services Department, 9/F Empire Centre, 68 Mody Road, Tsimshatsui East, Kowloon, Hong Kong.

Electrical and Mechanical Service Department, 98 Caroline Hill Road, Hong Kong.

Environmental Protection Department, 12/F Empire Centre, 68 Mody Road, Tsimshatsui East, Kowloon.

Urban Services Department, 12th and 13th Floors, Central Government Offices, West Wing, Ice House St.

Regional Services Department, Swire and Maclaine House, 19-23 Austin Avenue, Kowloon

Water Supplies Department, Leighton Centre, 12th Floor, 77 Leighton Road

Various outlying islands, the Kowloon Peninsular and the island of Hong Kong are all part of Hong Kong. Total land area is only 1,060km^2 and the total population in 1981 was approximately 5.2 million. Hong Kong's urban areas are amongst the most densely populated in the world.

The country's climate is tropical monsoon with annual rainfall of over 2,000mm - more than two-thirds of which falls between June and September. Incidence of waterborne diseases was estimated at 54 per 100,000 in 1984.

The government had ambitious plans in 1984 to improve general living conditions during the ten years of the Decade and to invest in housing, secondary education and new hospitals. There were no targets set for the Decade, but the plan was to maintain the high services level for new developments that were prevalent in 1980.

In 1980, water was provided to 95% of the population with 4% being served by public standpipes. About 1.5M.m^3 of water were supplied each day. Sewage from buildings was generally conveyed by separate sewer systems, and about 80% of the population are connected to sewers which discharge through marine outfalls after primary or secondary treatment.

Water is supplied by the Water Supplies Department of the Office of the Water Authority. The Public Works Department is responsible for sewerage facilities while the Urban Services Department is responsible for refuse and disposal of nightsoil.

Water rates in 1984 were US$0.24/m^3. Between 1981 and 1985 US$318M was scheduled for urban water projects and about US$89M for rural water.

The most severe constraint in 1984 was lack of water resources, but local supplies were being augmented by imports from the People's Republic of China, Guangdong Provinces, and wastewater treatment facilities were being planned for large new developments.

Other restraints included funding limitations, manpower, intermittent supplies and operation and maintenance.

Hungary

Currency: Forint 47.66 = US$1.00
Population: 10,657,000 (56% urban)
Official language: Magyar (Hungarian)
Population growth rate: -0.2%
GNP per capita: US$ 1,909
Life expectancy: 69.65 years
Infant mortality per 1,000 live births: 20.4
Water diseases per 1,000: 6.7
Literacy rate: 98.7%*

*Hungarian National Decade Committee figure

WATER AND SANITATION AGENCIES

Orszagos Vizugyi Hivatal (National Water Authority), Fo u. 44/50, 1011 Budapest
Telephone: +36 (1) 154 840
Telex: 224879

Vizgazdalkodasi Tudomanyos Kutato Kozpont - VITUKI (Research Centre for Water Resources Development), Kvassay J. ut 1, 1095 Budapest
Telephone: +36 (1) 338 160
Telex: 224959

Fovarosi Vizmuvek (Budapest Waterworks), Vaci ut 23-27, 1134 Budapest
Telephone: +36 (1) 402 100

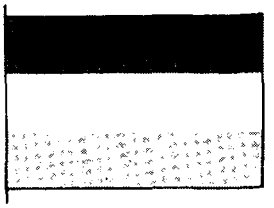
Uniformity of approach in the exploration and development of water resources in Hungary is supervised by the National Water Authority (OVH), an agency of state water administration established in 1953.

Water supply is controlled by regional water authorities and local and regional waterworks. Research and data collection for water management is undertaken by the Research Centre for Water Resources Development (VITUKI). Quality surveillance of water supplies in both urban and rural areas is undertaken on a regular basis by the Ministry of Public Health, the National Institute for Hygiene (OKI) and central and regional stations for hygiene and epidemy control.

The country has set up a National Committee on the Decade and set targets for achievement by 1990.

Urban areas already had a 100% water-supply coverage in 1985 with 92% of the urban population supplied via house connections and the remainder by public standposts. Almost 90% of the rural population were also said to have reasonable access to safe water in 1985. This is targeted to reach 100% by the end of the Decade.

In sanitation, there was also 100% urban coverage in 1985 with 79% of the urban population connected to sewers



and the remainder served by household systems such as septic tanks. By 1990, the proportion connected to the sewer systems is targeted to reach 84%.

In the rural areas, coverage with adequate sanitation facilities (pit privies, latrines etc) was 98% in 1985 and targeted to reach 100% by the Decade's end.

Estimate for investments were still being elaborated when the 1985 statistics were prepared, but, for the period January 1981 to December 1985, $644M was invested in water supplies and $334M in sanitation projects. This amounted to 4.65% of the country's total investment budget for the period.

The most serious constraint on expansion of the sector was funding limitations in 1985, followed by logistics difficulties and import restrictions. Others included intermittent water service and problems in operations and maintenance.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)		N/A			(1980)	N/A	
(1985 Actual)					(1985)		
6,008	5,500	500	4,800	1,208	4,649	4,550	4,550
(1990 Targets)					(1990)		
6,400	5,500	900	5,400	1,000	4,400	4,400	4,400

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
200	150	220	120

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.23	0.18	CERTAIN AREAS

India

Currency: Rupee 12.86 = US$1.00
Population: 765 million
Official languages: Hindi/Bengali/Maharathi/Telugi/Urdu
Population growth rate: N/A
GNP per capita: $270
Life expectancy: 56 years
Infant mortality per 1,000 live births: 105*
Adult literacy (M/F): 57/29*

*UNICEF, 1985

UNDP resident representative: PO Box 3059, New Delhi 11003.

WATER AND SANITATION AGENCIES

Ministry of Works & Housing (CPHEEO), Nirman Bhawan, New Delhi 110011.

Central Water Commission, Sewa Bhawan (West Block) BK Puram, New Delhi 110011.

Planning Commission, Yojana Bhawan, Parliament Street, New Delhi 110011.

Central Board for the Prevention & Control of Water Pollution, 5th & 6th Floors, 60 Nehru Place, New Delhi 110019.

The four regions of the world's seventh largest country are distinct and well defined: the Himalayan mountain zone, the western desert, the southern peninsular plateau and the Indo-Gangetic plain in the centre.

Major perennial rivers like the Indus and the Ganges provide surface-water resources in the north, but are also the source of occasional flooding and dire pollution.

India is divided into 22 states and nine Union Territories. The end of the national Sixth Development Plan on 31 March 1985 coincided with the end of Phase 1 of the International Drinking Water Supply & Sanitation Decade programme.

The percentage figures of population served suffer from an upward revision of total population - particularly in urban areas. For example, the old urban population estimate was 164.86 million, whereas the new one adds nearly 10 million to reach 174.55. In terms of urban population served with clean water it brings the percentage down from the old figure of 77.8% to 72.3%.

In the four years of Phase 1, the percentage of urban population served with clean water supply moved only slightly ahead of population increase. There were 115.48 million people - 72.3% - in urban areas receiving safe water. This had marginally shifted in 1985 to an estimated 127.23 million - 72.9%.

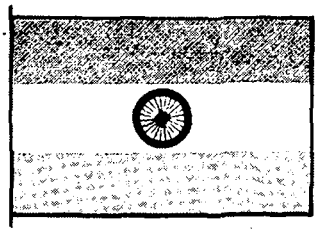
In rural areas huge strides have been made, however, with a shift from the 1981 figure of 162.07 million served - 30.8% - increasing to 56.2% of 313.56 million in 1985.

In sanitation in the urban areas the gains were rather better: to 28.4% of the 1985 population - or 49.56 million - from the 1981 served total of 40.03 million, or 25.1%

Advances were recorded in sanitation in the rural areas as well: from a served 1981 population of 2.8 million, to a 1985 figure of 4.03 million - 0.72%.

Allocations under the Seventh Plan indicate that initial optimistic Decade targets need to be revised downwards.

This suggests that in urban water supply some 90% of the population will be receiving coverage by 1990, and it is unlikely that in the single year that follows before the official end of the Decade, that figure can be substantially improved. In the rural sector a still impressive 85% coverage is still realistically anticipated.



For sanitation, the 1990 target is now 50% coverage in urban areas and 5% in the rural sector.

Funding to water and sanitation sectors is considered to be only one third of that proposed by the Ministry for the achievement of targets, and without central government funding the individual states are likely to be in a situation where they have little more than 25% of what has been termed minimum needs for substantial improvement. The Seventh Plan does however include a Central ARWSP financing component for all Government sectors.

High priority has been accorded the development of human resources. At the beginning of the Decade programme, there were some 9,800 graduate engineers and 15,800 diploma-bearing engineers in the water and sanitation sectors.

Despite the stress on educating engineers to degree and diploma standard, the targets for Phase 1 were not reached. It was estimated that by 31 March 1985, some 18,900 degree engineers and 30,800 diploma-standard engineers would be required. But it was calculated that only 11,400 degree and 18,600 diploma bearers were operating in the sector.

The lack of adequate training facilities is felt most particularly in the north-eastern region, and extends down to technician level as well. Recruitment of more engineers and technicians is seen as an urgent requirement.

The Ministry of Urban Development has designed several training and refresher courses - with 30 refresher courses conducted during the 1985-86 campaign.

In addition, six engineering colleges have been identified to provide post-graduate facilities for field engineers. There are also training courses in low-cost sanitation for engineers as well as programmes for motivating communities. Assistance in this is provided by the World Health Organisation and the UK's Overseas Development Administration.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
162,000	125,000		40,000		522,000	162,000	3,000
(1985 Actual)					(1985)		
196,947	150,048		47,160		556,983	284,917	3,864
(1990 Targets)					(1990)		
243,004	225,994		200,863		673,360	437,684	148,139

Indonesia

Currency: Rupiah 1644 = US$1.00
Population: 165 million (40% urban)
Official language: Bahasa Indonesia
Population growth rate: 2.1%
GNP per capita: $586
Life expectancy: 53 years
Infant mortality per 1,000 live births: 102
Water diseases per 100,000 people: N/A
Adult literacy (M/F): 83/65

UNDP resident representative: 14 Jalan M H Thamrin, P.O. Box 2338, Jakarta, Indonesia

WATER AND SANITATION AGENCIES

Department of Public Works, Directorate General of Water Resources Development, Jln. Pattimura 20, Kebayoran Baru, Jakarta.

Department of Home Affairs, Directorate General of Regional Development, Jln. Merdeka Utara No. 7, Jakarta.

Department of Health, Directorate General of Communicable Disease Control, Jln. Percetakan Negara 1, Jakarta-Pusat.

The 13,500 islands in the South China Sea that constitute Indonesia cover an area of some 1,919,000km^2 and stretch 5,000km from east to west. Volcanic mountain chains bisect the long, narrow islands leaving coastal plains of little breadth.

There is abundant rainfall and consequently sufficient ground and surface water resources, though there are severe problems caused by distance, reliability of source, contamination, excessive demand and conflicting use requirements.

Difficulties are particularly acute on the island of Java, where population pressures call for intensive farming and disproportionate concentrations of industrialisation and urbanisation. Water needs by 1990 will be 98% of available resources on the island.

Indonesia has 27 provinces divided into 216 districts (*kabupatens*) which in turn are split into 3,300 sub-districts (*kecamatans*).

Though it is virtually impossible to establish with any accuracy the exact percentage of disease directly waterborne or related, the incidence is undoubtedly high. In fact, the situation is substantially worse than in countries at a similar stage of economic development (Philippines, Thailand).

For the launch of the International Drinking Water Supply & Sanitation Decade, a National Steering Committee was established in 1980 and a plan for the Decade was published in 1982.

It targeted low-income groups promoting basic needs. The goal was 75% of people in urban centres having access to 60 l/day of drinking water, and the same amount for 60% of the rural population.

Public initiative, self-help and community participation are the themes pursued to achieve safe water and sanitation goals. Cost-recovery schemes have a high priority in urban and semi-urban areas.

A high priority is also accorded to rehabilitation, operation and maintenance of existing systems.

Technologies deemed appropriate - that is, acceptable and affordable by the beneficiaries - are stressed to allow accelerating sector development programmes.

Stress is given to institutional and human resources development in the relevant sectors.

Greater attention is paid to sanitation in rural areas to achieve a better national balance.

Targets of service for March 1989 and December 1990 (the end of the Decade) have been revised. For water supply it is sought that by the first landmark 70% of urban and semi-urban dwellers will have safe water supply and 75% of them by the end of the Decade.

Sanitation

In sanitation, there is no available figure for March 1989, but 60% are targeted by Decade's end. In the rural sector the figure is 40% by March 1989, with little improvement deemed possible before December 1990.

These figures should be read against 1985 figures of 60% safe supply for urban and semi-urban dwellers and 36% for rural people. However, these figures do not take into account system deficiences which reduce actual capacity by about one third.

In the same year, sanitation figures were estimated at 44% in urban and semi-urban areas, and 36% in rural districts.

In institutional terms, the Ministry of Public Works is responsible for urban and semi-urban water supply and sanitation through its Directorate General of Human Settlements. It recently assumed responsibility for piped water supply and artesian wells in rural areas.

The Ministry of Health's Directorate General of Communicable Disease Control and Environmental Health is charged with rural sanitation and non-reticulated water-supply facilities. It has two directorates: one for water and sanitation, and the second for environmental health.

In addition, there are three directorate generals within the Ministry of Home Affairs involved in water and sanitation: the Directorate General of Regional Development, the Directorate General of Village Development, and the Directorate General of General Administration & Regional Authority.

There are also local water works enterprises responsible for operation, maintenance and improvement and extension of water supply systems.

Total expenditure in the sector during the Third Plan - Repelita III (1979-84) - was 1% of total government development outlay, or some $750M. About 48% came from external sources.

Major contributors were the World Bank, the UN Development Programme, United Nations Children's Fund, World Health Organisation, the Asian Development Bank, the Netherlands Government, and the governments of Japan, Australia, West Germany, France, Denmark, Switzerland and Belgium.

Iran

Currency: Rial 72.2 = US$1.00
Population: 44.6 million*
Official language: Persian
Population growth rate: N/A
GNP per capita: N/A
Life expectancy: 58 years
Infant mortality per 1,000 births: 100 (1976)
Water diseases per 100,000: N/A
Adult literacy (M/F): 62/39

*World Bank (1985)

UNDP resident representative: Ave Gandhi, 3rd Street No. 43, PO Box 15875-4557, Teheran

The Islamic Republic of Iran covers an area of 1,648,000km^2 and roughly half of its 44.6 million population live in urban areas, almost 5 million of them in the capital Teheran.

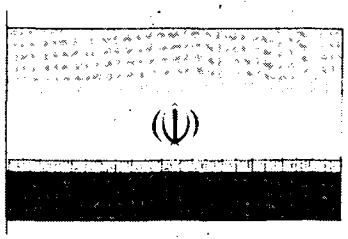
The government has observed particular principles in planning and programming for the International Drinking Water Supply & Sanitation Decade. These are:

- Supply of drinking water is complemented by sanitary disposal of excreta as a means of achieving a significant impact on health;
- Full coverage is to be achieved by self-reliant and self-sustaining programmes designed to promote the maximum use of local capabilities and to achieve financial and operational independence;
- Simple technology should be used and social relevance observed to ensure that facilities and services are consistent with customs and traditions, so that users can assume a large share of the task of operation and maintenance.

Water supply

In accordance with Ministry of Health policy, rural water supply and sanitation have been given the highest priority due to their substantial and immediate effects on the health of the rural population. There are about 61,000 villages in Iran with the following patterns of population and water supply levels:

Population range	*No of villages*	*Villages with safe water by end of 1983*
50	14,800	534
50-100	8,700	1,078
100-200	10,800	2,467
200-500	15,000	5,567
500-750	4,700	2,267
750-1,000	2,400	1,502
1,000-2,000	2,300	2,045
2,000	1,700	1,181



According to the Decade programme, the objective is to cover 90% of the rural population with safe drinking water and simultaneously to solve their excreta-disposal problems by 1990. As the above figures show, over 16,000 villages have to be covered by the project, which represent about 52% of the rural population. It was estimated that by mid-Decade, some 3 million people would have been provided with safe water or about 25% of the rural population.

Budgetary plan

According to the National Five-Year Plan (1982-6), estimated expenditure for rural water supply and sanitation was to rise from $90M in 1980 to $150M/year in 1983-86.

The project has been further supported by a bill finally passed by the parliament in March 1985 under which 30% of the total income of hospitals which are not included in the fee-for-service programme is paid to the General Department of Environmental Health. This money is to be used to implement the rural water supply plan and is estimated to be worth about $15-20M per year.

Iraq

Currency: Dinar 0.310 = US$1
Population: 15.6 million
Official language: Arabic
Population growth rate: 3.10%
GNP per capita: US$2,964
Life expectancy: 63 years
Infant mortality per 1,000 births: 73*
Water diseases per 100,000: N/A
Adult literacy (M/F): 86/62

*UNICEF, 1985

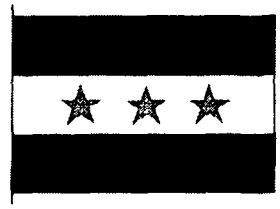
UNDP resident representative: UNDP, Building 153, Abu Niwas Street (102), PO Box 2048 (Alwiyah), Baghdad.

The great rivers, the Tigris and the Euphrates, flow through Iraq and leave rich silt deposits which form the basis of a high-yielding irrigated agriculture in the alluvial plain to the southeast of Baghdad.

North of Baghdad is low, mostly desert plateau; and deserts extend westwards to Jordan and Syria and southwards into Saudi Arabia. In the plains the summers are intensely hot with temperatures regularly reaching 46°C during July and August. About 178mm of rain falls annually in the plains, mainly between November and April.

The four main tributaries of the Tigris, the Great and Little Zab; the Adhaim and the Diyala, rise in the high mountains of the extreme northeast where high winter precipitation (1,000mm) falls mainly as snow.

Most of the urban population has piped water, mainly from surface sources and efforts are being made to increase supply to rural populations. A UNDP/WHO masterplan to 1990,



which was drawn up in 1976 had rural water supply as its prime objective.

Decade aims for the sector involve building treated supplies for urban areas to allow for population growth and an increase in consumption up to 450 lcd. Rural supplies will be increased to provide about half this amount of water per head. Simple sewage disposal facilities are planned for rural areas and it is hoped that the number of urban people served by modern sewerage will increase during the Decade from one million to six million.

Baghdad sewage works has been extended to cater for an extra 2.5 million people while sewage treatment works being built and/or extended in Basrah, Kerbala, Najaf and Kufa, Nasiria and Sulimania will provide a service for 3,285 million people.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
8,340	N/A	-	N/A	N/A	N/A	N/A	N/A
(1985 Actual)					(1985)		
10,200	10,200	-	4,000	6,200	5,400	2,920	620
(1990 Targets)					(1990)		
12,191	12,191	-	N/A	N/A	6,000	4,800	1,500

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
150	-	N/A	200	200	100

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.118	-	-

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	11.25

Jamaica

Currency: Dollar 5.48 = US$1.00
Population: 2.2 million*
Official language: English
Population growth rate: N/A
GNP per capita: $940*
Life expectancy: 73 years
Infant mortality per 1,000 births: 20**
Water diseases per 100,000: N/A
Adult literacy: N/A

*World Bank (1985)
**UNICEF (1985)

UNDP resident representative: 1 and 3 Lady Musgrave Road, PO Box 280, Kingston

WATER AND SANITATION AGENCIES

National Water Commission, 231A Old Hope Road, Kingston 6

One of the larger Caribbean islands, covering 284,000km^2, Jamaica has spent most of the first half of the Water Decade reorganising its water sector to permit optimum use of resources and overcome the periodic droughts that afflicted the system.

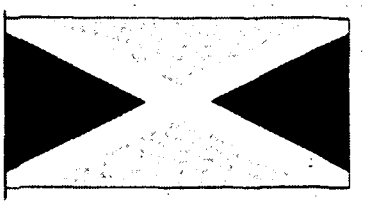
In the 1970s, the Greater Kingston area which contains 40% of the island's population, experienced tremendous growth. The droughts and foreign exchange limitations hindered provision of continuous supplies for this area and demand seriously exceeded supply. In rural areas, lack of maintenance of existing installations was a serious problem. Indiscriminate drilling of wells and over-pumping was beginning to lead to salinity problems in groundwater.

In 1980, the government combined two agencies, the Kingston-St-Andrews Water Commission and the National Water Authority to form the National Water Commission (NWC). Both the original organisations had suffered from loss of senior personnel and deterioration of facilities. The Jamaica National Investment Company was delegated by the Prime Minister to assess the NWC and consultants were selected to perform a three-month study.

They found a bad situation. The Hermitage reservoir was down to 10 days' storage, many parts of the Kingston supply system were locked off for most of the day, the physical plant had deteriorated and the utility had no money. The NWC also had serious operational fiscal and managerial problems.

The consultants were then hired in 1983 to provide counterpart advisory services, working side by side with the management and operation staff of the NWC to ensure that day-to-day operations were successfully carried out while long-term improvements were implemented. The consultants' $1.3M contract ran to March 1986.

The following improvements arose from this collaboration:



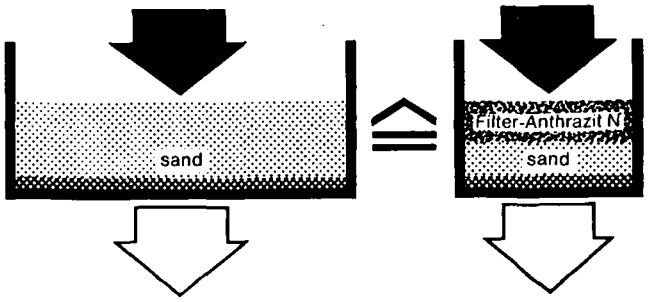
- By June 1983, an administrative reorganisation was achieved with clear lines of responsibility and accountability in specific functional areas;
- A three-year financial plan was generated in October 1983;
- Computer-generated rate and revenue options led to rate increases in November 1983 and August 1984;
- A uniform accounting system was generated in April 1984;
- Strict controls were imposed on hiring practices;
- The proliferation of overtime was brought under control; and
- A personnel policies manual was developed and mostly adopted by the board.

In collaboration with the Pan American Health Organisation, the first water quality standards were developed for the country and improvements were made in system monitoring and procedures. A system-wide survey of chlorination practices was also carried out and operations procedures altered.

The 100Ml/d Mona Water Treatment Plant was completed in 1985 treating water from the Yallahs and Negro rivers or from the Mona reservoir, which supplies Kingston.

By early 1986, a system was in partial operation to meet the water-supply needs of 23,000 people in the city of Mandeville, which has a total population of 130,000.

No current information on the country's sanitation situation is available, but in 1979 about 100,000 people were covered by sewerage in the Kingston area and about 95% of the country's population were reliant on septic tanks and pit latrines.



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Please phone or write for more information:

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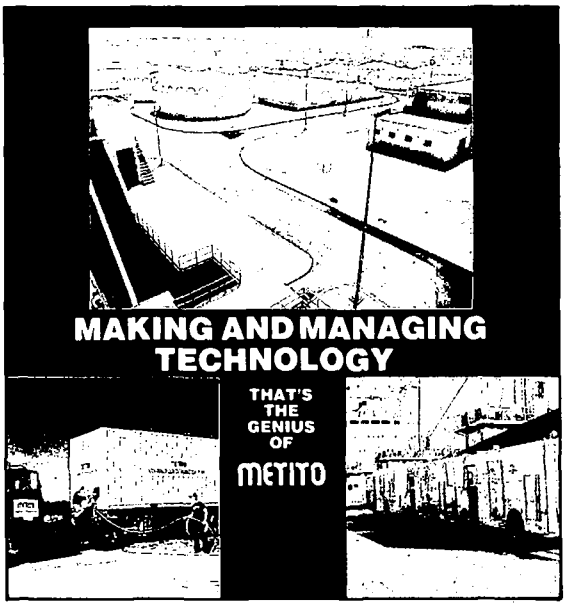

THE EXPERTS IN WATER, WASTEWATER TREATMENT & CHLORINATION

Metito designs, manufactures, installs, commissions, operates and maintains:

- Water treatment plants
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and other associated equipment and products.

Metito Group of companies with offices in USA, UK, Saudi Arabia and Cyprus.

METITO

Japan

Currency: Yen 146.6 = US$1.00
Population: 120.8 million (57% urban)
Official language: Japanese
Population growth rate: N/A
GNP per capita: US$10,630
Life expectancy: 77 years
Infant mortality per 1,000 births: 6
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Ministry of Health & Welfare, Chuo Godochosha 5-gokan 2-2, Kasumigaseki 1-chome, Chiyoda-ku, Tokyo 100
Telephone: 03 503 1711

Ministry of Agriculture, Forestry & Fisheries, Godochosa 3-gokan 1-3, Kasumigaseki 1-chome, Chiyoda-ku, Tokyo 100
Telephone: 03 502 8111

Ministry of International Trade & Industry, 3-1, Kasumigaseki 1-chome, Chiyoda-ku, Tokyo 100
Telephone: 03 501 1511
Telex: 22916 eidmit

Ministry of Construction, Godochosha 3-gokan, 1-3 Kasumigaseki 2-chome, Chiyoda-ku, Tokyo 100
Telephone: 03 580 4311

National Environment Agency, 1-2-2, Kasumigaseki, Chiyoda-ku, Tokyo 100
Telephone: 03 581 3351

National Land Agency, 1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100
Telephone: 03 593 3311

Japan Sewage Works Agency, c/o Ministry of Construction

The group of mountainous islands which make up Japan's 372,000-km^2 present special problems of water supply and sanitation. Although rainfall is high, averaging 1,600mm per year, its distribution is uneven.

In the north, including Hokkaido and Tohoku, precipitation occurs as snow between November and March, contributing 50% of the annual figure. In the central and southern regions, a rainy season occurs from June to July, and a second typhoon season from September to October. More than 50% of the total rainfall falls in these wet seasons, covering only 3.5 months of the year.

Topography combines with this rainfall pattern to give Japan's rivers distinctive characteristics. Only about 30% of the country's land area is flat and less than 100m above sea level. Rivers are short and steep – the longest is the Tone river with a length of 322km. The results are flashy hydrographs and a large seasonal variation in flow. Flood flows are typically 50 to 100 times greater than dry weather flows.

In addition to posing problems for river regulation, Japanese rivers are unsuitable for natural regeneration from pollution: most cities are located on the short final reach of the river across the coastal plain.

Sector administration

At central government level, a large number of ministries and agencies have responsibility for water supply and sanitation.

The Ministry of Health & Welfare authorises, supervises and subsidises all water supply systems for potable use. Industrial water supply falls to the Ministry of International Trade & Industry. In addition, the National Land Agency undertakes fundamental water resource planning for the five largest river basins, and the Environment Agency manages water quality for public use. The Ministry of Agriculture is responsible for irrigation, and the Ministry of Construction for resources development, flood control, and river abstraction licences.

The Ministry of Construction also supervises sewage disposal systems. The Japan Sewage Works Agency undertakes construction work on sewerage schemes for municipalities, and has a research and training function.

For public water supply systems serving less than 50,000 people, the Ministry of Health & Welfare delegates supervision to the Governor of a Prefecture. Prefectures or municipalities are also allowed to supervise on behalf of the Ministry bulk water supply enterprises, selling water directly to the waterworks, up to a capacity of 25,000m^3/day.

There are 17,619 water supply bodies in all, a fragmentation which has led to calls for reorganisation.

Water supply

In 1984, modern water supply systems served 111 million or 93% of the population. Most were large-scale public systems serving more than 5,000 people. The level of service is higher in the cities (96% served in 1985), than either the towns (83%) or villages (77%).

The cost of new supplies varied in 1984 between $1,500 and $2,000 depending on the size of the population served. The bulk water suppliers are the most expensive, but large-scale public systems have seen costs escalate because of the increasing cost of dam building.

Sanitation

Japan had an established system of sanitary disposal even before its industrial revolution began a century ago. Night-soil recycling was operating in the Edo era 300 years ago. The method enabled Tokyo to maintain a population of one million 200 years ago, the largest city in the world at the time. The system involved a market exchange of night soil for agricultural produce. Night soil fertilisation continued to be economic until about 30 years ago, when farmers switched to chemicals.

Sewered disposal systems have not yet caught up, a problem compounded by rapid urbanisation. Only 36% of the urban population were served by sewers in 1975, compared with for instance 65% in France and 70% in the USA.

A construction programme, running at $7,000M a year in 1977, is underway. Of the country's 3,257 municipalities, 579 (18%) had plans approved and work had started by 1977. The cost of construction is between $1,000 and $2,000 per capita in new towns – more for built up areas.

The programme aims eventually to serve 90% of the population.

Jordan

Currency: Jordan Dinar 0.34 = US$1.00
Population: 2.59 million (70% urban)
Official language: Arabic
Population growth rate: 3.8%
GNP per capita: $1,560*
Life expectancy: 67.3 years
Infant mortality per 1,000 births: 60
Water diseases per 100,000: N/A
Adult literacy (M/F): 87/63

*World Bank (1985)

UNDP resident representative: PO Box 35286, Abdel Hamid Zahrawi Street, Amman

WATER AND SANITATION AGENCIES

Water Authority of Jordan, PO Box 2412-5012, Amman
Telephone: +962 (6) 666111/7
Telex: 22439 WAJ JO

Ministry of Health, Jebel Al-Hussein, Amman
Telex: 21595

About 80% of Jordan's 91,000km^2 is desert with the country's only access to the sea lying along a 25km coastline around Aqaba in the south.

From this point, the Jordan Rift Valley runs north to the foot of Mount Hermon in Syria. The present Kingdom includes part of the Dead Sea and land to the east of the Jordan river, but not the occupied West Bank.

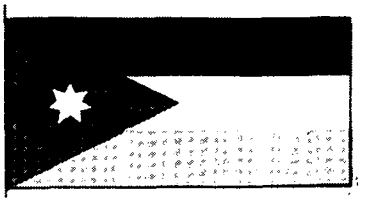
Rainfall ranges from moderate amounts (600mm/year) in the northern uplands to negligible amounts in the southern and eastern deserts, over 85% of which is lost through evaporation. Water scarcity in Jordan dictated use of resources in both urban and rural areas and thus, in the early 1960s, water supplies were given priority. Various authorities were set up to develop, operate, maintain and supply safe water to rural and urban populations.

Jordan's successive national socio-economic development plans paid attention to the water and sanitation sectors and created, in addition to the municipal authorities, four major authorities:

- National Resources Authority
- Water Supply Corporation
- Jordan Valley Authority
- Amman Water & Sewerage Authority

In January 1984, all these authorities were integrated into the Water Authority of Jordan (WAJ), to avoid duplication and produce better policy. The WAJ is responsible for water production, and distribution as well as wastewater collection and disposal.

Quality control is exercised in two phases: operational by the water authority; and monitoring by the health authorities.



About 87% of the population at the end of 1985 was supplied via house connections, with the remainder served through standposts, private wells or tankers. However, because of inadequacies in transmission and distribution systems, supplies in many areas were intermittent and over 30% of water produced was unaccounted for.

WAJ has set a target of serving all the population via house connections by 1990 and possibly before.

Sanitation

About 25% of the population is connected to a sewerage system. The remainder is served by septic tanks, cesspools, pit latrines and similar facilities. Occasionally, overflows or improper disposal of cesspool waste occur, creating major health hazards. Several outbreaks of cholera have occurred in Jordan, the latest in 1981. The incidence of water-related infectious diseases remains relatively high.

WAJ is aiming at 90% coverage of urban population by sewerage systems by 1990, with adequate means of proper sanitation for 95% of the rural population by the end of the Decade.

However, except for hepatitis and dysentry, the incidence of water-related disease does seem to be dropping, as shown by the following table:

Disease	Number of cases reported 1979	1983
Typhoid	260	62
Paratyphoid	42	9
Poliomyelitis	20	2
Hepatitis	211	517
Dysentary	83	175

The rise in diarrhoeal diseases could be attributed to better health awareness among the public and medical sector leading to increased seeking of help and better reporting of the diseases. In the case of hepatitis, the table does not show how much is serious or infectious.

Tariffs and charges for urban municipal water supply and sewerage have generally been in line with costs. However, ineffective control of groundwater extraction by industry and agriculture, where tariffs and fees have not been imposed or are less than costs, has contributed to the need for early development of distant water sources at high cost. A tariff study was due for completion at the end of 1986.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,550	1,208	342	280	1,178	683	444	231
(1985 Actual)					(1985)		
1,813	1,722	91	635	1,178	777	699	738
(1990 Targets)					(1990)		
2,271	2,271	-	2,043	228	973	973	924

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
70-100	N/A	250-350	200-250	70-100	100-150

Kenya

Currency: Kenya shilling 16.36 = US$1
Population: 20.4 million* (20% urban)
Official language: Kiswahili, English
Population growth rate: 4%
GNP per capita: US$290
Life expectancy: 54 years**
Infant mortality per 1,000 births: 76**
Water disease per 100,000: N/A
Adult literacy (M/F): 70/49

*World Bank (1985)
**UNICEF (1985)

UNDP resident representative: Kenya Railways HQ, PO Box 30218, Nairobi

WATER AND SANITATION AGENCIES

Ministry of Water Development, PO Box 49720, Nairobi
Telephone: Nairobi 723103

Kenya has an area of about 580,000km^2 and diverse topography. While more than half the country is arid or semi-arid, the Central Province has abundant perennial water from Mount Kenya and the Nyandarua mountain range.

Kenya's population growth rate is, at 4%, the highest in the world and a major cause for concern in the government since pressure on the fertile Central Province is now acute.

The government's long-term objective is to bring within reach of the population the benefit of safe water supply sufficient to their requirement for livestock and domestic consumption by the year 2000. Currently, there are 14 major water development programmes under way. These are:

1. Rural water supplies.
2. Settlement water supplies.
3. Self-help water supplies.
4. Rehabilitation programmes.
5. Livestock water supplies.
6. Urban water supplies.
7. Minor urban water supplies.
8. Sewage disposal programmes.
9. ASAL programmes.
10. Integrated development programmes.
11. Water quality and pollution control.
12. Water survey and planning (masterplans for districts).
13. Water conservation.
14. Private water sector development.

Development of the water sector, though mostly the responsibility of the Ministry of Water Development, is a shared responsibility with other ministries. Since its inception, the Ministry of Water Development has expanded its activities nationwide and undergone continuous expansion.

Present levels of coverage vary widely from as low as 4% in the North Eastern Province to 20% in Central Province, with an average of 15% coverage for the rural population. The unserved population was estimated at the end of 1986 to be 14 million.

A total of over 400 urban and rural water supplies are operated by the Ministry of Water Development. Currently, over 3.5 million people in rural and over 3 million people in urban areas are served by improved water supplies. The targets for providing water for urban and rural water supplies by 1988 will be 4.5 and 5.5 million people respectively.

Delays in physical implementation of programmes are blamed on lack of sufficient trained staff and overall budgetary constraints.

The government's water pricing policy was set out in the Fourth National Development Plan (1979-83), in which it was stated that "the policy of the government is that everybody will pay for water service". Pricing will be such that water rates will cover direct operation and maintenance costs for rural water supply schemes.

The plan further announced that the new tariffs would take into account ability to pay by users in different parts of the country and the government made it clear that provision of water to both urban and rura areas would be viewed as a provision of source and not as a source of revenue.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
2,414	1,436	615	1,180	960	13,486	2,055	2,590
(1985 Actual)					(1985)		
N/A	2,500		1,360	N/A	N/A	3,738	2,610
(1990 Targets)					(1990)		
6,119	5,507	612	4,325		19,193	11,516	8,300

Kiribati

Currency: Australian dollar 1.41 = US$1.00
Population: 62,100
Official language: I-Kiribati and English
Population growth rate: 2.2%
GNP per capita: US$290
Life expectancy: 52.5 years
Infant mortality per 1,000 births: 87
Water diseases per 100,000: 15,000
Adult literacy: 90%

WATER AND SANITATION AGENCIES

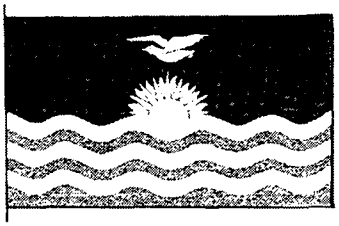
Ministry of Health

Ministry of Communications and Works

The Republic of Kiribati (formerly known as the Gilbert Islands) consists of 33 islands, mainly coral atolls of which 23 are inhabited. Total land area is approximately 720km^2, but the islands are scattered in an area of 5M.km^2 of the Pacific Ocean. According to the 1985 census, the population is 62,000. Tropical climate prevails uniformly with average temperatures of 26°C and an average rainfall of 1,654mm.

The National Health Plan is based on the National Development Plan (NDP) and the NDP is revised every four years. The National Health Plan takes into account and strives towards the goals of the Water Decade. A technical Task Force was formed to monitor the development and implementation of the plan.

The strategies of the National Health Plan are to concentrate on the preventative aspects of 39 priority diseases and family - planning problems; establish self-sufficiency through community efforts; establish integration and cooperation amongst divisions, relevant sectors, agencies and the community; and to utilise feasible methods and approaches that will help in the improvement of health.



Programmes which have been devised to achieve targets are: improvement of water supply, construction of sanitary wells and rainwater tanks; construction of sanitary latrines (water seal latrines); control of disease vectors and insect pests (mosquitos, houseflies and cockroaches); sanitary disposal of refuse and garbage; and health education.

The Ministry of Health houses an information centre (HIC), which provides reliable and appropriate information on health. Information is regularly received from all health centres in the country thereby facilitating relevant and valid data availability for monitoring planning and evaluation purposes.

Planning is done through the government, which fixes policies that are then implemented through the Public Health Division, the Medical Division and supporting sections. The projects then go to district, island and village level.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
18.74	1	13	-		40.02	8	3
(1983 Actual)					(1983)		
20	1	18	13	6	42.46	2	6
(1990 Targets)					(1990)		
N/A					N/A		

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	6.25

Republic of Korea

Currency: Won 844 = $1.00
Population: 41.1 million (65% urban)
Official language: Korean
Population growth rate: 1.25%
GNP per capita: US$2,032
Life expectancy: 68 years
Infant mortality per 1,000 births: 32.6
Water diseases per 100,000: N/A
Adult literacy (M/F): 96/88

UNDP resident representative: 94-37 Yongdongpo-Dong, Central Post Office Box 143, Area Code 100, Seoul.

Water and Sanitation Agencies: Ministry of Construction, Ministry of Home Affairs, Economic Planning Board, Ministry of Finance, Ministry of Health and Social Affairs, Local Government, Industrial Sites and Water Resources Development Corporation.

The 38th parallel divides the Korean peninsula and marks the boundary between the Republic of Korea, (south Korea) and the Democratic People's Republic of Korea to the North.

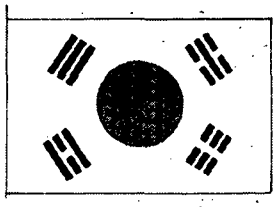
Most of the peninsula is mountainous and low-lying land is found only in the coastal plains and the river valleys. The main cities and towns and the best farmland are in the river valleys. The main rivers of the Republic are the Nakdong, which waters the south-eastern region, the Geum, the Yong San and the Han, which runs for 512km and empties into the Yellow Sea near Inchon.

Total land area of the Republic of Korea is 99,000km^2 and a population of 40 million makes heavy demands on available river water. It is expected that about 75% of the total population will live in urban areas by the year 2000.

Rainfall is abundant and average annual precipitation is 1,150mm, varying from 800mm in the east-central highlands to 1,600mm along the coastal belt. About 60% of the rain falls between July and September, and the normal runoff is about 22% of the total water resource. Control of river flows is therefore essential, and several dams have been built.

Industrialisation and urban growth have led to environmental problems in the river valleys and along the narrow coastal strip, and pollution is a serious threat to the quality of urban water supplies. The government plans to expand the existing urban supply systems, and to reduce leaks from water mains.

It is official government policy to eliminate infrastructure disparities between urban and rural populations and, as a result of piped water supply programmes, 80% of the urban population and 75% of the population of larger villages had a piped water service at the beginning of 1985.



By 1991, when the urban population will be nearly 32 million, it is estimated that 31,005,000 will receive water supply via house connections. The sewered urban population will then be 4,270. In 40,000 large villages (more then 20 houses, but less than 2,000 inhabitants), where there were no piped supplies in 1969, piped water reached 75% of the population in 1983, thanks to the self-help movement called Saemaul Undong, or the New Community Movement.

The Ministry of Health and Social Affairs (MOHSA) is responsible for rural water supply and the programme is implemented through provincial governments and their units of Gun (county) government and Myeon (rural district) offices. Within MOHSA, the rural village water supply programme is the responsibility of the Division of Sanitation Control, Bureau of Public Health. The National Institute of Health assists the programme through research and training of government officers. MOHSA is also responsible for surveillance of water quality from the health point of view.

City, town (*elup*) and rural district (*myeon*) water supply schemes are the responsibility of city governments and the Ministry of Home Affairs (MOHA) operates a special fund called Elup and Myeon Water Supply Financing Fund. New schemes are financed by a 60% loan from the Fund, a 10% subsidy from MOHA, and other subsidies from district and regional government organisations.

Flush toilets and pit latrines are used for urban sanitation and at the end of 1985, 2.5 million people had systems connected to public sewers and 26.8 million had household systems such as pit latrines, septic tanks etc. Flush toilets usually discharge into septic tanks and pit latrines are usually equipped with lined vaults which are emptied four or five times a year. In cities and large towns the nightsoil is removed by vacuum trucks although in rural communities it is emptied manually.

Sewerage systems often discharge into rivers and the sea without any treatment. However, the government is taking action to arrest degradation of the environment and sewage treatment plants are being built in all major cities and industrial areas. Houses and apartments with flush toilets must pretreat

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
25,400	21,800	-	2,200	23,200	12,700	7,800	12,700
(1985 Actual)					(1985)		
27,157	24,576	-	2,559	26,856	13,899	6,704	14,200
(1990 Targets)					(1990)		
		N/A				N/A	

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
364	250	294	165

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.19	0.15	NO

Republic of Korea (continued)

the toilets wastes in septic tanks. As an interim measure, nightsoil treatment plants have been built in cities and are planned in the towns.

In rural areas, the government is encouraging construction of a type of pit latrine which has three compartments to allow an adequate period of time for the destruction of pathogenic organisms. These ensure that only safe (decomposed) excreta is used as a fertiliser. Since 1982, a nine year $530M Saemaul Undong self-help programme of latrine construction has been underway with a target of 1,220 million latrines, covering one third of rural households.

Reduction in the use of raw, untreated excreta as a fertilizer, combined with great improvements in the standard of living has resulted in a dramatic reduction in the incidence of waterborne diseases. For instance, cases of typhoid fever were reduced from over 5,000 in 1969 to under 300 in 1980.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	1,260

Democratic Peoples Republic of Korea

Currency: Won 0.94 = US$1.00
Population: 20.4 million*
Official language: Korean
Population growth rate: 2.3%
GNP per capita: $940**
Life expectancy: 68 years*
Infant mortality per 1,000 births: 27***
Adult literacy: N/A

*World Bank 1985
**Population Reference Bureau, Washington (1984)
***UNICEF 1985

UNDP resident representative: Building 21, Munsudong, PO 27, Pyongyang.

WATER AND SANITATION AGENCIES

Ministry for Construction

Ministry of Urban Land Administration

Ministry of Public Health

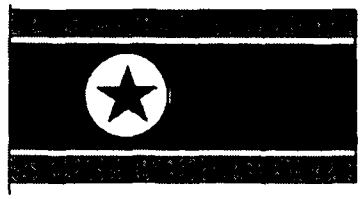
The Democratic People's Republic of Korea covers 122,300km^2 and is divided administratively into provinces, counties and *ris*. The President is the head of State and there is a Central People's Committee, an Administration Council and a Supreme People's Assembly of elected members.

The country operates planning cycles of 5-7 years. A new plan was announced as being in preparation in July 1985.

The entire population has access to water supply and sanitation services. Urban consumption is 300-500 litres/head/day and rural consumption is 100-150lhd. Urban wastewater is collected in sewerage systems and in rural areas excreta is composted and used in agriculture.

A national plan for the Decade is part of the overall Water Resources Plan.

The country's socio-economic development is based on "Juche" philosophy. The social and economic needs of the population are met through a system of community participation in decision making and implementation with technical support from professionals. Science and technology are



well developed and self-reliant. National resources are abundant.

Planning, administration and other organisational functions of water supply and sanitation are discharged as follows: Planning - urban areas, committee for urban land and administration; rural areas, agricultural committee of each province and county; Technical design - urban areas, committee for construction; Construction - urban areas, Ministry for Construction; rural areas agricultural committees; Cooperation and maintenance - urban areas, Ministry of Urban Land Administration; Water quality control - urban and rural areas, Ministry of Public Health.

Decade plans were said in 1983 to be progressing satisfactorily and pipeline projects were well developed and progressing.

Kuwait

Currency: Dinar 0.273 = US$1.00
Population: 1.7 million
Official language: Arabic
Population growth rate: 6.2%
GNP per capita: $14,480*
Life expectancy: 72 years*
Infant mortality per 1,000 births: 25**
Water diseases per 100,000: 231.6 (1984)
Adult literacy (M/F): 76/63

*World Bank (1985)
**UNICEF (1985)

UNDP resident representative: Dasman Square, PO Box 2993, Safat, Kuwait

WATER AND SANITATION AGENCIES

Ministry of Electricity & Water, PO Box 12 & 54, Safat - 13001, Kuwait
Telephone: 489 6000
Telex: 30060 MEWPG KT

Ministry of Public Works, PO Box 8, Safat - 13001, Kuwait
Telephone: +965 2449301
Telex: 22753 ASHGHAL KT

The highest land in Kuwait's sandy desert only reaches a height of 300m, sloping down from the east to the sea. Total land area is 17,818km^2.

Kuwait has hot dry summers and relatively cold winters with an average rainfall of 115mm. The temperatures varies widely from 45°C in July to 8°C in January on average. Evaporation averages 14.1mm/day and may attain 24.6mm during summer months.

The total population of Kuwait (1,695,128 in the 1985 census) is considered to be urban except for some beduin nomads moving round the desert.

Incidence of water-related diseases in 1984 was as follows:

Incidence per 1,000 population

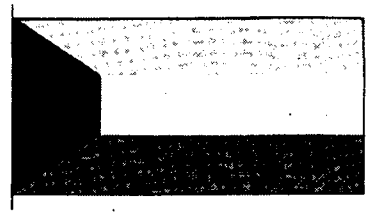
Salm. gastroenteritis	41.8
Inf. hepatitis	157.4
Typhoid and paratyphoid	14.0
Dysentry	10.1
Giardiassis	8.4

Fresh water is obtained from two sources: desalination plants associated with power stations at Shuwaikh, Shuaiba and Doha; and natural groundwater from fields at Rowdatain and Um-Al-Aish.

The country now has five desalination plants producing about 814,000m^3/d. A new 363,000m^3/d plant is now under construction at Ras Al-Zor.

The usual rate of groundwater production is about 1,900m^3/d, which, when necessary, can be raised to around 135,000m^3/d. Brackish water has also been discovered in various parts of the country which can be used for household, agricultural, street sprinkling or livestock purposes, or blended with distilled water for drinking. Present output of such wells is around 190,000m^3/d.

The Ministry of Electricity & Water plans to raise fresh and brackish water storage capacity as a stand-by for emergencies and for meeting the changing pattern of consumption. This



involves the construction of 43 underground reservoirs with different capacities in various areas. Total capacity of existing reservoirs is about 3.7M.m^3, with another 2.2M.m^3 under construction.

More than 80% of Kuwait's population had access to public drinking-water supply through house connections in 1985. This should rise to 85% by 1990. The remainder, in non-organised areas, obtain their drinking water from private vendors delivering by tanker. The number of consumers supplied in this way is gradually reducing because of new distribution pipelines in the newly developed areas.

Based on the current expansion programme, the entire population will have access to piped supplies by 1990.

Some 80% of the population also have access to the public sanitary sewage system which has expanded rapidly in the last five years. This should reach 90% by 1990. Those buildings not connected to the sewerage network are provided with a septic tank and a percolating pit. Tanks are emptied when full by tankers and the waste deposited in afforestation areas indicated by the Municipality, Ministry of Public Works and Agriculture Department.

A severe constraint for sector development is insufficiency of trained personnel, with difficulties in recruiting qualified and efficient staff. Insufficiency of trained sub-professionals, and some difficulties with operation and maintenance of the sewage system led authorities to give considerable parts of the schemes to contractors.

Laos

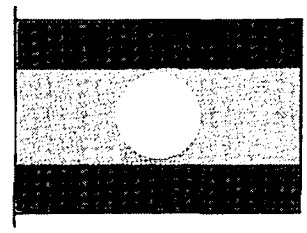
Currency: Kip 35 = US$1.00
Population: 3.8 (15% urban)
Official language: Lao
Population growth rate: N/A
GNP per capita: $100
Life expectancy: 46 years
Infant mortality per 1,000 births: 284
Water disease per 100,000: 17,900
Adult literacy (M/F): 92/76

UNDP resident representative: Rue Phone Kheng, BP 345, Vientiane.

A mountainous, land-locked country, the Lao Popular Democratic Republic (Laos) is in a strategic position bordered by China to the north, Vietnam to the east, Kampuchea to the south and Thailand and Burma to the west. The river Mekong forms its western boundary and the east is bounded by the Annamese chain of mountains.

The country divides into four major regions: the rugged mountains of the north-east, where the Xieng Khouang Plateau is the only relatively flat area; the limestone plateaux of the south sloping towards the Mekong river; the Mekong lowlands; and the Annamese mountain chain along the Vietnam border.

Climate is tropical monsoonal and the amount of precipitation varies according to the elevation and exposure to the south-west monsoon, which brings a hot, wet season between June and October. A cool dry season occurs between November and February, and



a transitional hot, dry season runs from March to May.

Mekong tributaries, the Nam Ou, Nam Ngum, Nam Ca Dinh and Nam Bang Hieng, are the main rivers of the country. Outside the Mekong basin, the Nam Het Song Ma and the Nam Het Song Chu flow across Vietnam to the Gulf of Tonkin.

Ninety per cent of the 3.8 million people live in villages, many of which are remote and inaccessible. Extensive areas of the natural forest cover have been cleared for agriculture.

During the period of the last national plan (1980–85), the total budget was US$2,577.3M, of which US$991.7M came from external sources.

Clean water supply is a major problem, and in 1983, only 653,000 out of a total rural population of 3,264,000 had reasonable access to clean supplies. In the cities, only about 20% had individual house connections. The sanitation situation is also unsatisfactory and only 139,000 villagers had access to suitable sanitation such as pit latrines. Among the urban population, only 1,500 had public sewerage connections and 6,000 were served by other systems such as septic tanks. The Ministry of Public Health is concerned with drinking water and sanitation improvement.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
540	104	10	10	50	3,060	380	100
(1983 Actual)					(1983)		
581	144	20	15	60	3,256	653	139
(1990 Targets)					(1990)		
		N/A				N/A	

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
175	1.25	-	130	5.50	15

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.35	0.38	

Lebanon

Currency: Pound 115.4 = US$1.00
Population: 2.7 million
Official language: Arabic
Population growth rate: N/A
GNP per capita: N/A
Infant mortality per 1,000 births: 44
Water diseases per 100,000: N/A
Adult literacy (M/F): 86/69

UNDP resident representative: Rouko and Melber Building, PO Box 11-3216, Beirut.

WATER AND SANITATION AGENCIES

Compagnies des Sources du Liban S.A.L. (SANNINE), Zouk Mikael, Kissirwan, PO Box 394.
Telephone: 914471
Telex: 2271

Société des Eaux Minerales Libanaises SAL (SOHAT), Town Falougha, Metn.
Telephone: 570388

According to Ministry estimates, Lebanon will need 1,985M.m^3 of water by 2000. Provision is expected to come from unexploited reserves using 420M.m^3 of groundwater and 2,925M.m^3 of surface water.

Planning options involve selection of the most economic and hydrologically and technologically suitable sites for development.

The most pressing needs in the next few years include rehabilitation and renovation of community supplies, which have been damaged during the war; provision of extra water for larger communities suffering from an acute shortage of potable water (with priority being given to Beirut and its suburbs); action to prevent loss from the distribution system and to control illegal use of public water supplies; establishing of regional laboratories and the enforcement of laws pertaining to control of pollution.

In coastal regions, prohibition or control of groundwater abstraction in order to prevent saline intrusion should be considered.

A long-range programme for water resource development would include satellite identification of groundwater resources; development of surface and groundwater supplies; impoundment of rivers and streams; and construction of mountain dams to store snow melt and surface run off.

Water resources and the technology for their development are available but if they are to be exploited a viable masterplan, professional manpower and adequate funds are required.

In 1985, it was reported that a steep fall in government revenues, a lack of skilled manpower and a general demoralisation of state agencies had combined to prevent the launch of a series of eight major dam and reservoir projects. They formed part of an ambitious water development programme unveiled in 1983 by the Council for Development & Reconstruction, the state agency responsible for rebuilding damage to the economy caused by the continuous fighting.

In March 1986, Italy announced provision of $8.75M to meet the costs of building two new water pumping stations in Beirut, where the water supply system has been badly damaged. The grant was to cover planning, equipment supply and start-up.

Lesotho

Currency: Maloti 2.06 = US$1
Population: 1.5 million (13% urban)
Official language: Sesotho, English
Population growth rate: 2.3%
GNP per capita: US$470
Life expectancy: 51 years
Infant mortality per 1000 births: 130
Water diseases per 100,000: 31
Adult literacy (M/F): 62/84

UNDP resident representative:
Red Cross Building
PO Box 301 Maseru 100

WATER AND SANITATION AGENCIES

Central Planning & Development Office, PO Box 666, Maseru, telex 344BB

Ministry of Water, Energy & Mining, Maseru

Ministry of the Interior, Maseru

Ministry of Cooperatives & Rural Development, Maseru

Ministry of Health, Maseru

Surrounded on all sides by South Africa, Lesotho is a small mountainous country with 30,355km^2 land area supporting a total population of 1,500,000, 87% rural.

Surface water of good quality is available from many mountain springs throughout the country. In fact water is one of Lesotho's major assets and the country is currently involved in a major US $1.5 billion project, the Highlands Water scheme, which will involve diverting waters of the Senqu river system for use in South Africa.

In 1985 46% of the population was without safe water and 58% without adequate sanitation.

A Decade plan was drawn up in 1983 which laid down 1990 targets of 100% coverage for urban water supply, 86% urban sanitation; 60% rural water supply and 45% rural sanitation.

Water supply

Plans for urban water supply for 1990 envisaged provision of house connections to 59% of the urban population with 41% having reasonable access to standpipes. The number of urban dwellers supplied by house connections in 1985 was 65,000 or 35% of the urban population, while 56,000 or 30% were supplied by standpipe.

House connections would need to increase to 144,000 by 1990 and the number served by standpipes to 100,000. The total level of urban water supply coverage at the beginning of the Decade was just 36% so there has been a substantial improvement.

About 30% of the rural population, or 396,000, were supplied with safe water in 1985 compared with only 11% at the outset of the decade. This is planned to increase to 864,000 by 1990, which would represent coverage for 60% of the rural population.

Sanitation

The government envisages provision of sewer connections to only 16% of the urban population by 1990, with the majority (70%) relying on other adequate means of excreta disposal.

In 1985 only 22% of the urban population had adequate sanitation, 12% by connection to sewers (22,000 people) and 10% (19,000 people) by alternative methods. This compares with 13% at the beginning of the Decade to reach the 1990 target of 95% coverage, sewer connections would increase to cover 40,000 people while 172,000 would be served by alternative methods.

Rural sanitation was available to only 14% of the rural population or 181,000 in 1985. This is the same percentage as reported at the outset of the Decade though a larger population is covered. The 1990 target is for service to a population of 644,000, or 45% of the rural population.

Planning

Lesotho has a training budget for Decade staffing requirements but believes this may prove inadequate. No precise staffing requirements have been drawn up.

Per capita costs of supplying urban water and sanitation are reported to be: US$275 for house connections; US$140 for standpost service; US$300 for sewer connection; and an average of US$40 for other methods. In the rural areas per capita costs are US$25 for provision of safe water and the same for adequate sanitation.

The estimated cost of fulfilling Decade targets is US$114M which compares with an actual investment in the sector for the five years to 1985 of US$41.06M which was 10.5% of total development investment during that period. External costs were US$34.25M or 83% of the total.

The government is attempting to promote women's involvement in water supply and sanitation provision. A woman has been appointed liaison officer for the rural sanitation project.

Liberia

Currency: Dollar 1 = US$1.00
Population: 2.18 (40%)
Official language: English
Population growth rate: 3.36%
GNP per capita: US$470 (1984)
Life expectancy: 55.5 years
Infant mortality per 1,000 births: 119
Water disease per 100,000: 11,800
Adult literacy (M/F): 47/23

UNDP resident representative: Liberian Bank for Development & Investment Building, Tubman Boulevard, PO Box 274, Monrovia.

WATER AND SANITATION AGENCIES

Liberia Water & Sewer Corporation, Monrovia

With a 580km coastline, Liberia covers an area of 105,260km^2. A narrow coastal plain gives way to inland hills and low mountains, rising to 1,500m on the northeast border with Côte d'Ivoire. The Cavalla river forms part of this frontier, but most rivers rise in Guinea on the northern border. The Mano river forms part of the frontier with Sierra Leone to the west.

Water supply situation

In 1980, only about 15% of the population had access to clean drinking water, and there was no clearly defined government policy in the sector. By 1985, the situation had improved greatly, with almost all (93%) of urban communities supplied (half from standpipes), and 23% coverage in rural areas, making a national average of 54%.

At the beginning of the Decade, it was estimated that less than 12% of the population had access to safe sanitation. Public latrines were being built in high-density low-cost city areas, and pit privies in villages, but there is no information on present coverage in urban areas, except that only 5% are sewered. In rural areas, sanitation has reached less than 2% of the population.

Decade plan

The Liberian Water & Sewer Corporation undertook a general sector study in the early 1980s, proposing guidelines

for a Decade plan which is being prepared.

It envisages complete urban sanitation, half by sewers and half by other methods, but sanitation will only reach 17% of the rural population. However, complete access to safe water countrywide is proposed.

In the first five years of the Decade, Liberia spent $28M (75% of it provided externally) against an estimated cost of reaching its targets of $148M.

Lack of skilled manpower is a major constraint. A training budget has been established, but deemed insufficient. The country employs about 1,000 staff apart from unskilled workers, but more than half are clerical. In spite of this, collection of tariffs from householders with private connections proves very difficult (standpipes are free), so that income does not meet costs.

The financial difficulty is compounded by a scarcity of loans. In 1980, it was reported that the lack of a definite Decade policy meant that many projects were not assessed for external funding, loans cost too much, donor agencies took too long appraising projects, and both multilateral and bilateral agencies were insufficiently flexible and generous.

Traditionally the USA has been the biggest donor, providing $90M a year in aid for the whole economy.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(1985 Actual)					(1985)		
875	397	418	50	-	1,306	303	24
(1990 Targets)					(1990)		
1,030	361	188	505	525	1,529	1,529	260

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
113	N/A	125	40	15	10

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
26-250	19	26-250	19

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
N/A	N/A	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	147.6
Investment totals (US $ millions 81-85)	28.07

Libya

Currency: Dinar 0.32 = US$1
Population: 3,600,000
Official language: Arabic
Population growth rate: N/A
GNP per capita: $7,170
Life expectancy: 60 years
Infant mortality per 1,000 births: 90
Water diseases per 100,000: N/A
Adult literacy rate (M/F): 81/50

UNDP resident representative: PO Box 358, Tripoli

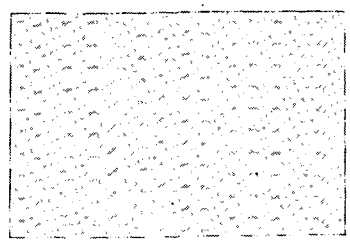
WATER AND SANITATION AGENCIES

Secretariat of Planning, Jamahiriya Street, Tripoli

Secretariat of Health, Tripoli

Great Man-Made River Project Management and Implementation Authority, PO Box 81188, Tripoli
Telex: 20955 GAMMRA
and; PO Box 641, Benghazi
Telex: 40236 JABAL

Covering an area of 1,759,540km^2, the Libyan Arab Jamahiriya is principally a desert country with a population growing at an estimated annual rate of 3.5%.



National plan

The 1981-85 Transformation Plan allocated $770M for urban and rural water supply and $1,300M for urban and rural sanitation. However, the fall in oil prices prompted a sharp decline in government spending, and since 1982 a freeze has been in effect on all new projects, except those considered to be of 'strategic' importance. Only about 6% of the 1981-5 plan has been implemented. There was to have been a 1986-90 plan, but it had not been published in June 1987 because of continuing uncertainty over oil prices.

Water supply

Between 1976 and 1980, the proportion of overall development expenditure invested in community water supply and sanitation was 7.6%, representing an annual average investment in the sector of $450M, all of which came from internal sources.

The approximate cost of urban water supply construction per person served has been estimated at 1980 prices at $1,000, while the cost per person of urban sewerage is $1,800. The unit construction cost, at 1980 prices, of urban household sanitation (septic tanks, pour-flush latrines etc) - and also the rural equivalents - is estimated at $300.

By far the biggest water sector scheme, and the only one where contractors are receiving regular payments, is the Great Man-Made River. This involves a series of major pipelines to carry an eventual 6M.m^3/d of water from beneath the southern deserts for use along the coast, where groundwater supplies have been severely depleted by overpumping. The first phase, a 1,900km pipeline in the east of the country, is under way, and bids for the second phase, a similar line in the west, were submitted in 1987. The entire scheme will cost an estimated $25,000M.

National sector planning is the responsibility of the Secretariat of Planning, while at local level responsibility lies with the municipalities (*baladiyat*). The Great Man-Made River scheme is being overseen by its own autonomous authority. For desalination plants, the responsible bodies are a series of regional power companies. Military authorities provide army camps and barracks with facilities comparable to the rural level of service.

Inadequate cost-recovery framework and insufficiency of trained professional and sub professional personnel are major constraints on improvements in the sector. Other severe constraints include: an inadequate legal framework; inappropriate institutional framework; inadequate water resources; lack of planning and design criteria; inappropriate technology; intermittent water service; poor operation and maintenance; and logistics.

Macau

Currency: Pataca 8 = US$1.00
Population: 400,000 (97% urban) (1982)
Official language: Portuguese
Population growth rate: 2% (1975-1981)
GNP per capita: US$2,020 (1980)
Life expectancy: 65 years (1980)
Infant mortality per 1,000 births: 18 (1980)
Water diseases per 100,000: 42 (1980)
Adult literacy: 90

WATER AND SANITATION AGENCIES

Sociedade de Abastecimiento de Aguas (SAAM)

Servicos de Planeamento (SPECE)

The peninsula of Macau, together with its two offshore islands Taipa and Coloane, covers 15.5km^2. Formerly a Portuguese colony, Chinese sovereignity was established by a protocol in 1979 which allows continued Portuguese administration.

Although Portuguese is the official language, Cantonese is the language of commerce, and English is widely spoken: 3 million visitors arrive from neighbouring Hong Kong every year, providing the largest part of the government's revenue, from taxes on gambling. For the same reason, the Hong Kong dollar is legal tender and in wider circulation than the official pataca.

Macau's water supply comes from the adjacent Chinese city of Zhuhai, through a 12km pipeline. In 1980 it was estimated that 89% of the mostly urban population had house connections and 10% access to standpipes. However in 1982, the *Far Eastern Economic Review* reported that the infrastructure was "grossly inadequate" with unreliable electricity and water supplies. The outdated civil service was unable to cope with the influx of illegal Chinese immigrants which began in 1978, increasing the population by 50% by 1982.

In 1980, it was reported that 80% of the urban population was connected to the municipal sewerage system, with the remaining 20% using satisfactory household systems.

The rural population (10,000 in 1980) was said to have access to safe water supplies, with 60% having some form of sanitation facility.

A decade plan was published in June 1980, which envisaged complete water supply coverage by house connections for the projected 418,000 city population, with 98% also connected the mains sewers. In the rural areas, where the population was expected to reach 11,000 by 1990, 91% would have safe water and 73% adequate sanitation.

However, since these targets were set, a new Portuguese governor has taken office (in 1981) with ambitious plans to modernise the civil service and attract foreign investment. It is not known how far these reforms have improved services in the water and sanitation sectors.

Madagascar

Currency: France Malgache 1375.95 = US$1
Population: 10 million (22% urban)
Official languages: Malagasy, French
Population growth rate: 2.78%
GNP per capita: US$240
Life expectancy: 49 years
Infant mortality per 1000 births: 69
Water diseases per 100,000: 6,900
Adult literacy (M/F): 74/62
UNDP resident representative: Rue Raubutovo Antsahavola, BP 1348, Antananarivo

WATER AND SANITATION AGENCIES

Ministère des Travaux Publics, BP 295, Anosy, Antananarivo, telex 22343 MTP

Jiro Sy Rano Malagasy (JIRAMA) BP 200 Antananarivo

Directorat Général du Plan, Ministère des Finances et du Plan, BP 674, Antananarivo

The island of Madagascar has a land area of 590,000km^2 and is off the east coast of Africa. It has three geographical zones: the eastern coastal plains, the high central plateaux, and the western plateaux. Rain is abundant on the tropical eastern slopes averaging 1,500mm annually, and 1,200mm annually in the high plateaux. Elsewhere rainfall varies between 300mm and 1,100mm annually.

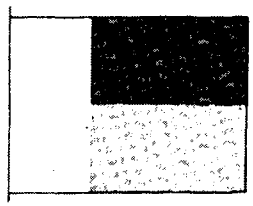
Surface water is not abundant but there is substantial groundwater which in some areas is of good quality. The government believes that 70–80% of the country's potable water needs can be met from groundwater resources.

The population of almost 10 million is 78% rural, the majority working in the agricultural sector. The government has not drawn up specific Decade targets but has formulated water supply plans to the year 2000. This aims to provide all urban dwellers with house connections at an estimated daily consumption of 70 litres/day and to establish water points in rural areas for the entire population - with a maximum of 15 minutes travelling distance.

In 1985 more than 68% of the population was without access to safe water and over 81% without adequate sanitation in 1985.

Water supply

In 1985, 81% of the urban population of 2,197,000 were supplied with adequate water: 379,000 or 17% by house connection. A further 1,410,000 or 64% of urban dwellers were served by public standpipe. This represents a slight improvement over 1980 when 80% of the population or 1,720,000 people had access to clean water. However, only



1,342,000, or 17% of rural dwellers, were served with adequate water supply though this has to be compared with a figure of just 7% for 1980. Madagascar has supplied an additional 842,000 people with water during that period.

The government's plan runs to 2000 and the first phase covers the period from 1978–92 and was intended to provide all 200 communities of more than 2,000 inhabitants with water supply systems, either by repairing existing malfunctioning installations or providing new ones. The second phase 1992–2000 was to concentrate on installing water points for communities of less than 2,000 people.

By 1990 the country estimates that it will be serving 15% of the urban population by house connection and 60% by public standpipe, an increase from 1,789,000 to 1,895,000 in numbers served but a drop from 81% to 75% in percentage coverage. The estimate for the rural community is that 23% will be provided with clean water a real increase from the 1985 figure of 17%.

Sanitation

The government has not produced specific sanitation objectives. Six provincial capitals and nine other urban centres have excreta evacuation systems though the capital, Antananarivo is the only one with sewage treatment facilities. Most of the urban systems are open sewers/storm drains and maintenance is poor.

In rural areas only 28% of the population were estimated to have septic tank or pit latrine facilities in 1980 but this may have been an overestimate since in 1985 it was estimated that 87% of the whole population was without adequate sanitation. No figures for rural populations were available while it was estimated that 1,212,000 people (55% of town dwellers) had house connections.

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ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,720	330	1,050	60	90	7,020	500	N/A
(1985 Actual)					(1985)		
2,197	379	1,410	1,212	N/A	7,789	1,342	N/A
(1990 Targets)					(1990)		
2,502	1,895		N/A	N/A	8,911	2,005	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
121	15	N/A	37	42	N/A

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	65.26
Investment totals (US $ millions 81-85)	10.22

Madagascar (continued)

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
65	30	45	20

UNIT COSTS OF WATER PRODUCTION (US$/m^3)		
Average cost	Operation average water tariff	Progressive water tariff
0.17	0.21	YES

Decade Costs

The government calculates that the cost of providing water by house connection averages US$121 per person with standpipes costing US$15 per person. Water tariffs, which are progressive, are estimated to cover average costs of water production. Per capita costs of urban sanitation - not including sewer connections - are US$37.

The total cost of reaching Decade targets is estimated as US$65.26M which compares with a total sector investment over the five years of 1985 of US$10.22M. This amounted to less than 1% of the total development budget for the country and was financed mainly (67%) by external finance. Investment would need to increase by about four times to reach Decade targets.

Decade approaches

The government reports that about 50% of rural communities participate in maintenance and operation of improved water supply, with some 8% involving themselves in actual building. However there is no participation in planning.

Water supply and sanitation are part of a national maternal child care and nutrition programme and women's participation has been encouraged in the sector as part of programmes by the Red Cross and by the National Front for the Defence of the Revolution.

EXPLORATION

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S-161 20 BROMMA, Sweden
Tel +46 8 764 60 60
Telex 13079 ABEM s

Malawi

Currency: Kwacha 2.3 = US$1
Population: 7.06 million (12% urban)
Official languages: English, Chichewa
Population growth rate: 3.3%
GNP per capita: US$170
Life expectancy: 44.6 years
Infant mortality per 1000 births: 151
Water diseases per 100,000: N/A
Adult literacy (M/F): 52/31

UNDP resident representative:
Plot No 7, Area 40 PO Box 30135
Lilongwe 3

WATER AND SANITATION AGENCIES

Water Engineer-in-chief, Department of Water,
Tikwere House, P/Bag 390, Lilongwe 3
Telephone: 732 155

Ministry of Health, PO Box 30377, Lilongwe 3

Lilongwe Water Board Box 96, Lilongwe
Telephone: 732 766
Telex: 4517 MADZI MI

Blantyre Water Board, Box 30369, Chichiri, Blantyre 3
Telephone: 672 000
Telex: 4455 WATER MI

With a land area of 91,490km^2, Malawi shares borders with Tanzania, Mozambique and Zambia. It is a land-locked least developed country with one of the lowest GNPs per capita in the world. The cost of transportation for exports and imports has been a major economic constraint for the country.

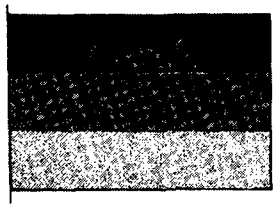
Malawi's population is 7.06 million and is rising at an annual rate of 3.3%. Around 12% of the population or 847,000 people lived in urban areas (compared with 10% in 1980). This is expected to expand to 1,259,000 people by 1990 and provision of water and sanitation is unable to keep up with this pace of urban growth. In percentage terms less people in urban areas will be supplied with adequate water and sanitation in 1990 than in 1985.

Water supply

About 55% of the population is currently estimated to have access to clean water. A Decade plan was under preparation in 1986. Meanwhile provisional targets are to provide house connections for 62% (776,000) of the urban population by 1990 and standposts for a further 18% (232,000). Thus a total of 80% of the urban population will have access to clean water by 1990 compared with the 1985 level of 97%. Breakdown of service in 1985 is as follows: 73% (620,000) of urban dwellers were supplied by house connection while a further 24% (198,000) were supplied by public standpipe. Urban coverage at the beginning of the Decade in 1980 was 77%.

The government aims to provide 67% of the rural population with clean water by 1990 compared with about 50% in 1985 and 37% at the beginning of the Decade. The rural population is expected to grow from 6,212,000 in 1985 to 7,030,000 in 1990. Half of the 1985 population (or 3,099,000 people) had an adequate clean water supply and targets for 1990 were for provision of safe water to 4,687,000 people.

Decade targets for urban sanitation are for 70% coverage in urban areas, 11%



(140,000) by house connection and 59% or 740,000 by other means. No targets have been established for rural sanitation.

Resources required

Skilled and professional staff shortages have been a major constraint the government has reported. It now estimates that it will require various additional staff resources to achieve Decade targets, including 1,000 more craftsmen and 120 more technical staff, along with five managerial level and 15 more administrative level staff. There is a training budget but it is considered insufficient by the government.

Total investment in the sector during the five years to 1985 was US$18.73M which was slightly more then 3% of total development investment for that period. No figures are available for total investment required for the Decade though this was estimated towards the beginning of the Decade as $266M.

The government has undertaken a successful programme of rural piped water projects throughout the country covering a population of 581,300 partly funded by USAID. The Malawi rural piped water programme has been based on delivery of low cost untreated water with intakes from mountainous streams sited high enough to avoid contemination.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
576	307	136	90	486	5,431	1,995	4,400
(1985 Actual)					(1985)		
847	620	198	N/A	N/A	6,212	3,099	N/A
(1990 Targets)					(1990)		
1,259	776	232	140	740	7,030	4,687	N/A

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	18.73

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
50-300	27	50-300	10-27

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.60	0.20	YES

Malaysia

Currency: Ringgit 2.494 = US$1.00
Population: 15,677,000 (35% urban)
Official language: Malaysian
Population growth rate: 2.70%
GNP per capita: US$ 2,033
Life expectancy: 70.15 years
Infant mortality per 1,000 births: 17.46
Water diseases per 100,000: 410
Adult literacy (M/F): 81/66

UNDP resident representative: Blocks K9 & K10, Jalan Duta, PO Box 12544, Kuala Lumpur

WATER AND SANITATION AGENCIES:

Ministry of Works, Jalan Mahameru, 50580 Kuala Lumpur
Telephone: 03 291 9011
Telex: MA 30415

Water Supplies Branch, Public Works Department, Jalan Mahameru, 50582 Kuala Lumpur
Telephone: 03 291 9011

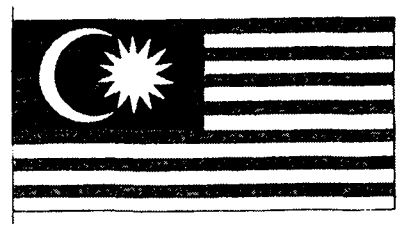
With a land area of 336,700km^2, Malaysia occupies the Malay Peninsular and States of Sabah and Sarawak in north western Borneo Island. The two regions are separated by about 643km of the south China Sea. Peninsular Malaysia, covering 134,680km^2 has its frontier with Thailand. Sabah and Sarawak, totalling 202,020km^2 lie north of Indonesia's Kalimantan.

About four-fifths of Malaysia is covered by forests and swamps. Between the coasts and mountainous interior is the agricultural zone where rubber, oil palm and rice cultivation is located. Tin mining is common on the west coast.

The average daily temperature throughout Malaysia varies from 21°C to 32°C. Humidity is high. The average rainfall is 2,540mm per annum although greater rainfall is registered in the east coast of Peninsular Malaysia and Sabah and Sarawak.

Although there is no formal national plan for the Water Decade, the goal and objectives of the decade and that of "Health for all 2000" have been incorporated in the 5-year National Development Plans. The current plan, the Fifth Malaysia Development Plan, covers the period 1986-1990.

Malaysia's development is guided by the Government's New Economic Policy. The basic objective of the government in the water supply sector is to provide safe water to all. The policy developed under this philosophy includes supplementing with groundwater sources the rural water systems based on surface water. Simultaneously the government has undertaken the National Water Resources Study, designed to establish a basic framework for the orderly planning and implementation of water resources development programmes.



The government's policy of raising the standard of health of the rural population through the rural water supply and sanitation programme includes the construction of rural water supply systems and installation of sanitary pour-flush latrines. Policy also includes health education amongst the rural population involving the sanitary disposal of sullage and solid waste and vector control.

The Economic Planning Unit (EPU) of the Prime Minister's Department is the central planning agency responsible for all socioeconomic development programmes in the country. The Infrastructure and Utilities Department of the EPU is also responsible for water supply and sanitation.

In the Ministry of Works, the Water Supply Branch of the Federal Public Works Department provides technical assistance for all water authorities, except in the states of Sabah and Sarawak. The Water Supply Branch is also the coordinating and implementing agency for federally funded water supply projects and is implementing agency for water supply schemes of the Federal Land Development Authority and for regional development projects: Pahang, Tenggara, Johor Tenggara, Terengganu Tengah are some of the regional development projects.

All completed water projects are handed over to the states for operation and maintenance. The Water Supply Branch is also responsible for water supply (operation and maintenance) in the newly created federal territory, Labuan.

Ultimately the state governments are responsible for water supply and this responsibility is exercised through the water boards, the State Public Works Departments or the State Waterworks Departments.

In rural areas the following levels of service - listed in order of priority - are available:

Piped water supply with individual house connection with and without treatment which are further classified as:
a. Public water supplies for group of vill-

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
4,595	4,130	367	700	4,181	8,841	5,905	4,850
(1985 Actual)					(1985)		
5,487	5,081	200	980	4,530	10,190	7,720	6,144
(1990 Targets)					(1990)		
6,620	6,620	-	3,177	3,442	9,130	7,578	6,026

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
150	N/A	300	200	26-160	2.5

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	563*

*Water supply only

Malaysia (continued)

ages provided by the Public Works Department; b. Community-based projects with partial or no treatment, constructed by the community with technical and financial assistance from the Ministry of Public Health; and c. Privately owned supply systems by management of plantations and mines (under the Ministry of Labour).

Standpipes with and without treatment.

Community water well system funded through the Ministry of Health (normally one well supplies 5-15 households); and

Rainwater catchment systems. This system is limited to the coastal areas where there is no alternative water supply.

In terms of sanitation, flush toilets with septic tank and pour-flush latrines are the only latrines considered acceptable. Pit latrines have been used where water supply is still lacking, but, once it is made available, these latrines are converted to pour-flush.

In 1985, 74.4% of the rural population was served by a water supply system compared with 55.5% in 1980. Similarly there has been improvement in the sanitation sector with 68.8% of the rural population covered by sanitation facilities in 1985 compared with 48.6% in 1980.

The Public Health Overseer is responsible for identifying projects, and the community the project will serve is involved in the project in various stages of its implementation.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
230	160	230	120-160

UNIT COSTS OF WATER PRODUCTION (US$/m³)*

Average cost	Operation average water tariff	Progressive water tariff
0.18	0.25	N/A

*1983

The Rural Environmental Sanitation Programme, which was launched in 1974, has continued into the third and fourth Malaysia Plans, its main objective being to reduce incidence of communicable diseases associated with poor sanitation. The number of projects implemented under this programme in 1985 was 59,435 serving a total population of 322,035.

Following a number of major epidemics of waterborne diseases the government has a revised surveillance programme for water quality which should identify possible problem areas and take remedial measures.

Maldive Is

Currency: Rufiyaa 7 = US$1.00
Population: 181,000 (25% urban)
Official language: Divehi
Population growth rate: 3.23%
GNP per capita: US$524
Life expectancy: 52 years
Infant mortality per 1,000 births: 63
Adult literacy (M/F): 73/42*

*UNICEF, 1985

UNDP resident representative: Oakvilla, 4 Kulhidhoshumagu, PO Box 2058, Male

WATER AND SANITATION AGENCIES

Maldives Water & Sanitation Authority, Male
Telephone: 3209

Ministry of Health, Male
Telephone: 3775

The Republic of Maldives is a chain of 1,200 flat coral islands with a total land area of 298km². Only about 200 of the islands are inhabited, and only the capital Male is considered urban.

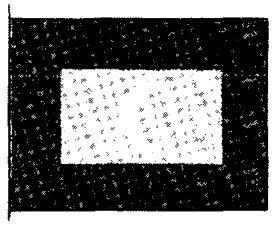
Average annual rainfall is 1,950mm, which recharges freshwater lenses in the coral. In January 1981, it was reported that a groundwater study was under way. The results are not known. There are no rivers; drinking water is obtained from wells and rainwater catchments. Groundwater supplied 85% of urban requirements in 1981, and rainwater the rest.

Currently (1985), 59% of the 46,000 urban population have a safe water supply, but there are no house connections. Less than 12% of the rural population have access to safe water. However, these figures are a vast improvement on 1980, when coverage in the town was a mere 11% and in the country 3%.

Similar improvements have been observed in urban sanitation, with 80% of households in Male now connected to sewers, compared to 20% in 1980. The rest of Male also has septic tanks. These improvements are the result of the Male Water Supply & Sewerage Project, which cost $12.5M and was cofinanced by the Saudi Fund for Development, the European Economic Community, and Kreditanstalt für Wiederaufbau (West Germany).

In rural areas, sanitation remains poor, serving less that 2% of the population.

In 1980 the government adopted a National Health Plan, designed to combat recurrent epidemics of water-related diseases. Severe outbreaks of gastroenteritis occured in 1965, typhoid



fever in 1966, cholera in 1978, and diarrhoea in 1968 and 1982.

The Water Decade Plan, an integral part of the Health for All by the Year 2000 compaign, was completed in 1980. It is planned by the end of the decade to serve 92% of the projected 64,000 urban population with a clean water supply. Of the predicted 151,000 people living in rural areas in 1990, 80% should have safe water.

In the sanitation sector, all households in Male will be connected to the new sewerage system, and 40% of people in rural areas will have sanitary disposal facilities.

Per-capita construction costs are $100 for urban water, $12 in rural areas, $90 for sewer connection in Male and $12 for rural sanitation. Villages help plan rural water and sanitation schemes, and do all the building work and operate the systems.

The Maldives Water & Sanitation Authority works with the Ministry of Health coordinating all planning in the sector. There are 24 qualified staff in planning, managerial and technical grades, and 40 artisans and clerical staff. A training budget has been established, but is deemed insufficient.

By 1985, $3.9M had been spent out of an estimated $17M needed to meet Decade targets, indicating that investment needs to be more than doubled for the rest of the decade.

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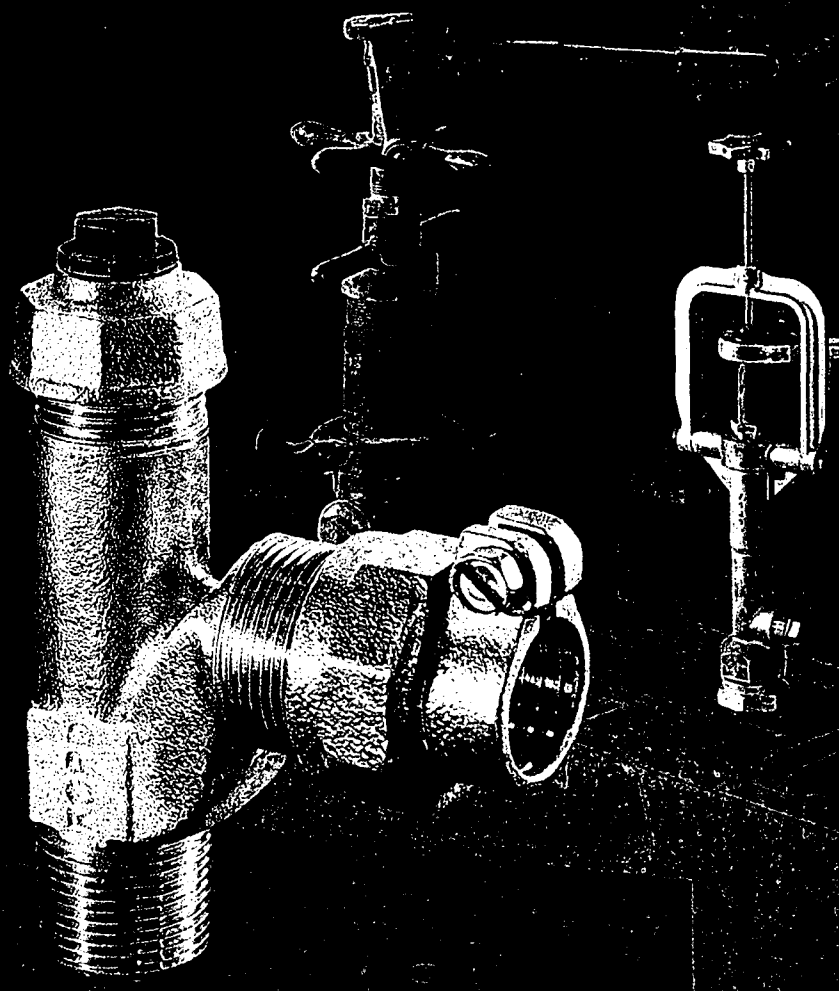
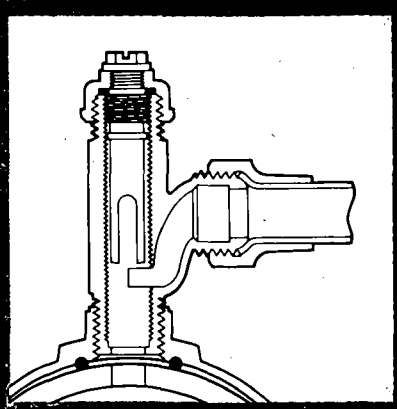


RapidTap's inlet thread is standard tapered AWWA. Optional outlets include female iron pipe, copper flare, or the Ford Pack Joint. Ford can supply the cutter operating wrench, or you can use a standard ¼" ratchet wrench extension.

With a new friend like **RapidTap**, saying goodbye to some old friends can be very easy — as easy as **RapidTap**ping PVC! Contact The Ford Meter Box Company, Inc., or your Ford Distributor, for information on the **RapidTap** system.



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Mali

Currency: CFA Franc 307 = US$1.00
Population: 7.91 million (20% urban)
Official language: French
Population growth rate: 2.6%
GNP per capita: US$142
Life expectancy: 40 years
Infant mortality per 1,000 births: 150
Water diseases per 100,000: 80,000
Adult literacy (M/F): 23/11

UNDP resident representative: Immeuble Maître Hamacire N'Doure, BP 120 Bamako

WATER AND SANITATION AGENCIES

Direction Nationale de l'Hydraulique et de l'Energie (DNHE), BP 66 Bamako
Telex: 406

Direction Nationale de l'Hygiène Publique et de l'Assainissement (DNHPA), Bamako

Direction Nationale de l'Operation Puits (DNOP), Bamako

Direction Nationale de l'Urbanisme et de la Construction (DNUC), Bamako

A land-locked West African country, Mali covers 1,240,192km^2 in the Sudano-Sahelian belt, with more than half of its territory in desert or semi-desert zones. Annual rainfall varies between 300mm and 1000mm over most of the country, but rises to 1,300mm in the southern savannah region.

The country is administratively divided into the Bamako capital district, seven regions, 46 'cercles', 181 arrondissements, and 10,350 villages. The criterion for urban classification is 5,000 people.

The rivers Niger and Senegal flow through Malian territory, and groundwater yields between 15m^3/h and 200m^3/h to individual boreholes.

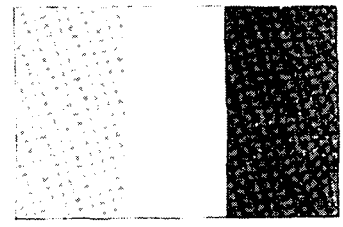
National economy

The economy is based on livestock and agriculture, with other sectors only in an embryonic state. In 1980 there were 1,300km of metalled roads within the borders, and a further 3,654km leading to neighbouring countries. In addition there were nearly 7,000km of good weather roads. There is telephone communication between towns, a radio station, and several telecommunications projects.

The National Economic & Social Development Plan for the period 1981-1985 had a budget of $530M. Of this, $23.2M was spent in the water and sanitation sectors, almost all of it (95%) financed externally. This expenditure represents only 8.5% of the estimated cost of reaching Decade targets, which have been revised downwards since 1980.

Supply situation

About 46% of townspeople have access to potable water, mostly from standpipes, a proportion unchanged since 1980. The number of house connections has actually decreased but extra provision of public water points has kept pace with population growth.



Sanitary provision has not kept up with the growth of the towns, although it remains at a high level; 90% of the urban population is served compared to 95% in 1980, almost all by septic tanks. Sewers serve 10,000 people, the same number as in 1980.

However, most Malians (80%) live outside the towns, and it is here that substantial improvements have been made. In 1980 the number of people with access to safe water was immeasurably small (0.1%). Now 10% of the rural population has a reasonably safe source, and 3% have some sort of sanitation.

In 1980 it was planned to provide water and sanitation throughout urban areas by 1990, and for between 50% and 60% of the rural population. Current planning envisages 48% of town dwellers will have an adequate water supply by then, and 94% will have sanitary disposal facilities. In rural areas, 36% should have safe water, and slightly less (30%) some form of sanitation.

Responsible agencies

All the water and sanitation agencies take part in general planning, while loans are negotiated by the Ministry of Foreign Affairs and the Ministère du Plan.

Groundwater exploration is the preserve of the DNHE, which works in tandem with DNOP on all water supply sectors in rural areas. DNHE also has responsibility for supervision and construction of urban schemes.

The DNHPA is charged with monitoring water quality, and together with DNUC is responsible for the design of urban sanitation, which DNUC implements. Municipal technical services and some private companies are also involved in urban sanitation.

Investment needs

Principal constraints to development cited in 1980 were lack of finance, personnel, and logistical support, insufficient knowledge of resources, poor

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,000	248	203	10	945	5,994	8	6
(1985 Actual)					(1985)		
1,589	238	490	10	1,424	6,325	633	190
(1990 Targets)					(1990)		
1,882	565	339	19	1,750	7,080	2,549	2,124

Mali (continued)

maintenance, and inadequate hygiene education.

In collaboration with women's groups, there is now a rural public health campaign, supported by continuing UNICEF projects. Community participation at all stages of water and sanitation projects from planning to operation is said to be complete.

Costs of construction of water schemes are now between a quarter and one fifth those of 1980. Then it was estimated that urban water supply cost, per capita, $424 (now $100 for house connections and $14 for standpipes). In rural areas the cost has come down from $246 per head to $50. Sanitation is also cheaper to provide now.

This means that the downward revision of the decade budget from $1,762M in 1980 to $272M in 1985 is not the swingeing cut the bare figures suggest.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
100	14	120	50	50	8

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
60	40	50	15

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.33	0.22	NO

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	272
Investment totals (US $ millions 81-85)	23.2

Malta

Currency: Lira 2.9 = US$1.00
Population: 358,000* (75% urban)
Official language: English, Maltese
Population growth rate: 0.7% (1980)
GNP per capita: US$3,310*
Life expectancy: 73 years*
Infant mortality per 1,000 births: 11**
Water diseases per 100,000: N/A
Adult literacy (M/F): 86/82**

*World Bank, 1985
**UNICEF, 1986

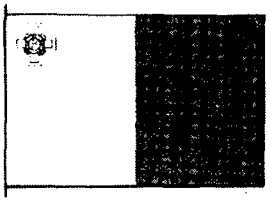
WATER AND SANITATION AGENCIES

Water Works Department, Ministry of Development of Infrastructure, Merchants Street, Valletta
Telephone: 221901
Telex: 1100 MOD MLT MT

The Mediterranean island of Malta has a land area of 246km², and a low annual rainfall - less than 250mm in dry years. With nearly 360,000 inhabitants, Malta is one of the most densely populated parts of Europe. With increasing demand from industry, tourism, and improved living standards, the island has had to turn to desalination to supplement its meagre natural fresh water resources.

In 1980, all the 236,500 urban population had water supplies with house connections, and connections to municipal sewer systems. The small rural population of 79,500 had safe water, and 84% of them had adequate sanitation.

By 1983, Malta's demand had increased to 72,500m³/d, against supplies from groundwater of 49,450m³/d. Two reverse-osmosis desalination plants, at Ghar Lapsi and Marsa, came on stream in July 1983, producing together 22,700m³/d. The second island of Gozo met all of its 4,750m³/d demand from groundwater, with some rainwater catchment storage.



The country has no Decade plan, but expects the whole population, urban and rural, to have full water supply and sanitation coverage by 1990. Extra demand will be met largely through water-saving schemes (leak detection), and better storage with new reservoirs and repair of existing cisterns.

Per-capita costs of domestic water supply by house connection were $28 in 1980, and cost of water production $0.51/m³. It is not known how desalination has changed this cost. A sophisticated tariff structure is in operation, with charges for domestic consumers varying from $0.015/m³ to $0.72/m³ depending on consumption, and separate tariffs for hotels, industry, commerce, government departments, and shipping.

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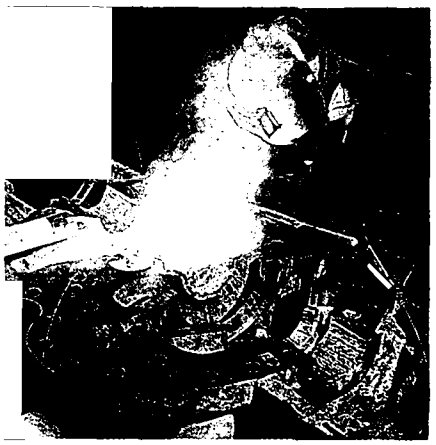

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Mauritania

Currency: Ouguiya 74.8 = US$1.00
Population: 1.89M (35% urban)
Official language: Fulfulde, Hassaniyah
Population growth rate: 2.93%
GNP per capita: US$363
Life expectancy: 44 years
Infant mortality per 1,000 births: 137
Water diseases per 100,000: 17,942
Adult literacy: 17% (1980)

UNDP resident representative: Avenue Gamal Abdel Nasser, Ilot K, Lot 208, BP 620, Nouakchott.

WATER AND SANITATION AGENCIES

Ministère Hydraulique et Habitat, Direction de l'Hydraulique, BP 356 Nouakchott.
Telephone: 516 11/516 02/516 71
Telex: 815 DHYDRIM MTN

Société National d'Eau et d'Electricité (SONELEC), BP 355, Nouakchott.
Telephone: 523 08
Telex: 587

Ministère du Développement Rural, Direction de l'Agriculture, BP 180, Nouakchott.
Telephone: 220 20
Direction de l'Elevage, BP 175, Nouakchott.
Telephone: 512 72/515 67
Direction du Genie Rural, BP 313, Nouakchott.
Telephone: 520 20

Ministère de la Santé et des Affaires Sociales, Direction de la Santé, BP 1177, Nouakchott.
Telephone: 520 52/ 537 91

The culturally diversified population of the Islamic Republic of Mauritania occupies an area of 1,030,700km^2. Most of the country is in the Sahara, with the southern part in the Sahel.

Rainfall is minimal, evaporation high, and there are no perennial rivers. Watercourses flow once every three or four years, or a few days each year at best. Flow in the Sénégal river, which forms the country's southern boundary, depends on these erratic floods, and is Mauritania's only surface source.

Elsewhere, groundwater predominates, and the country can be classified into regions according to well depth. In the west, well depths range from 25m to 85m, and most wells are lined with concrete. In the east, construction is much the same, but well depths rarely exceed 30m. In the north and north-east are found exclusively traditional wells, mostly unlined and rarely more than 25m deep.

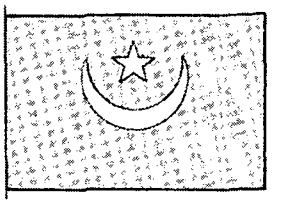
Supply situation

Three-quarters of the 654,000 urban dwellers have a safe water supply, mostly from standposts. There are no data on water supply in rural areas, where 65% of the population live, although, in 1980, 85% were estimated to have access to clean water.

Only 8% of urban people have access to a safe sanitary disposal facility, and probably none outside the towns. The incidence of waterborne disease appears to have more than doubled since 1980 when it was reported as 8,200 cases per 100,000 inhabitants.

Principal agencies

The Direction de l'Hydraulique, an arm of the Ministère Hydraulique et Habitat, is responsible for urban water supply and sanitation. It also has a say in planning rural services with the Ministère du Développement Rural. Operation and maintenance in the towns is undertaken by SONELEC.



Investment needs

Internal sources can provide no more than 10-15% of investment in the water sector, which must rely on external aid. Principal contributing organisations are the World Bank, UNSO and CEAO.

No figures are available for investment so far in the water sector. In 1980, it was reported that $17.7M would be invested in urban water supply and $12.5M in rural, under the Fourth (five-year) Plan of Economic and Social Development, which ended in 1985. Estimated unit costs of construction were $470 per person for private connections, and $50 per person in rural areas. Urban sanitation by septic tanks was said in 1980 to cost $88 per head.

These estimated costs have not been updated, and so it is impossible to calculate the cost of the 1990 target, which is to supply 99% of townspeople (the mix of house connections and standpipes proposed is unknown) and 59% of the rural population. There are no plans for rural sanitation; in the towns, it is planned to provide sanitary facilities to 43%.

Mauritius & Rodrigues

Currency: Rupee 12.78 = US$1.00
Population: 990,000 (43% urban)
Official language: English, French
Population growth rate: 1.44%
GNP per capita: US$1,020
Life expectancy: 68 years
Infant mortality per 1,000 births: 24
Adult literacy (M/F): 89/77

UNDP resident representative: Anglo Mauritius House, Intendance Street, PO Box 253 Port Louis

WATER AND SANITATION AGENCIES

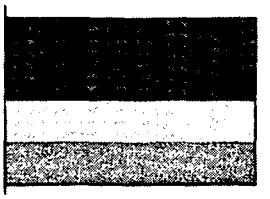
Central Water Authority, Port Louis

Ministry of Works, Port Louis

Ministry of Health, Port Louis

Ministry of Economic Planning & Development, Port Louis

These Indian Ocean islands occupy an area of 1,940km^2 and have a population close to a million, growing at a rate of 1.44% per year. The economy, based on sugar, was contracting at the rate of 8.6% per year in 1980.



Supply situation

The whole population is said to be served by safe water supplies, in the towns entirely from house connections. Urban sanitation is also reported to be complete, 58% of the town dwellers being connected to municipal sewers. In rural areas it is estimated that 86% of the population has adequate sanitation.

In the late 1970s, 8.4% of the national development budget was spent in the water and sanitation sectors, and in 1980 alone, $14M was spent on water and $2.45M on sanitation. There are no data for recent investment in the sectors.

Similarly, it is not possible to say if the problem of intermittent service, cited as a major constraint in 1980, has been solved. The average water tariff ($0.23/m^3$) covers 80% of the cost of providing the service.

Responsible agencies

The Central Water Authority has wide responsibility for groundwater exploration, water quality control, and all aspects of urban and rural water supply, including operation and maintenance. Sanitation, urban and rural, is the province of the Ministry of Works, assisted in planning, design and inspection by the Ministry of Health, which also has a role in water quality control.

Overall planning is the job of the Ministry of Economic Planning & Development. A plan for the Decade, begun in 1980, has not been finalised, and no Decade targets have been published.

However, the sector is extremely well staffed in Mauritius, with 234 employees in managerial or technical grades, 834 in artisan and clerical posts, and 786 unskilled workers.

ACTUAL AND TARGET LEVELS OF COVERAGE

	Urban population served (000's)					Rural population served (000's)		
	Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)	410	287	123	225	185	(1980) 547	536	492
(1985 Actual)	429	429	0	250	179	(1985) 569	569	490
(1990 Targets)	N/A	N/A	N/A	N/A	N/A	(1990) N/A	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
50	N/A	N/A	N/A	50	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
200-225	125-150	200	125

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.29	0.23	YES

Mexico

Currency: Peso 1,200 = $1.00
Population: 78,800,000
Official language: Spanish
Population growth rate: 2.1%
GNP per capita: $2,080
Life expectancy: 67 years
Infant mortality per 1,000 births: 73
Water diseases per 100,000: 6,566
Adult literacy (M/F): 92/88

UNDP resident representative: Apartado Postal 6-719, Mexico 6 DF

WATER AND SANITATION AGENCIES

Secretaria de Desarrollo Urbano y Ecologia (SEDUE),
Av Constituyentes No. 947,
Edificio B Planta Alta,
01110 Mexico, D.F.
Telephone: 271 1616

Secretaria de Salud,
Lieja 8 Piso 5,
Mexico 6, D.F.
Telephone: 553 0758
Telex: 1773429 CSSAME

Secretaria de Agricultura y Recursos Hidraulicos,
Av Insurgentes 476,
06760 Mexico, D.F.
Telephone: 584 0839
Telex: 1772781 SAGME

United Mexican States (Mexico) is the southern-most part of North America with frontiers with the United States to the North and Guatemala and Belize to the South.

The country is virtually divided in half by the Tropic of Cancer and thus into temperate and tropical zones, although altitude variations are more important climatically than latitude.

Water resource development is generally expensive in Mexico because of a disparity between water resources and population concentration. About 68% of all water resources are concentrated in the Gulf and southeast regions, which consume only 8% of total demand.

On the other hand, the northern and central regions in which 75% of the population is concentrated, generate only 5% of the water resources and consume 47% of supplies.

However, the government is trying to improve the pattern of population distribution through policies embodied in the National Urban Development Plan and the National Industrial Development Plan.

The percentage of total population with access to water supply systems increased from 49% in 1970 to 58% in 1981. Sewerage service levels increased during the same period from 37% to 38%. Water service coverage through house connections in urban areas other than Mexico City, however, decreased from 65% in 1970 to 55% in 1981 and sewerage service levels fell from 55% to 43% during the same period. These decreases were offset by rural increases in access to water services from 21% in 1970 to 51% in 1981 (44% through house connections and the rest by public stand pipes.) Rural sewerage services increased from 4% to 13% in that period.

For the Decade 1981-91, the targets are to extend water services to some 83% in urban areas and 58% in rural areas and sewerage services to about 62% in urban areas and 27% in rural areas.

There are 97,000 rural communities in Mexico, of which only 20,000 have water supply systems. The remaining 77,000 communities have been included in the federal Programme for Integrated Rural Development which is a comprehensive plan to provide water supply, sanitation, public health and agricultural development. In view of the difficulties in setting up separate water systems in the small communities, they are being linked with neighbouring municipalities.

At present, water and sewerage tariff levels and structures are inadequate in most cities. Minimum consumption levels are often too large, and there is insufficient progress in rate slabs to allow cross-subsidisation. There is no uniform tariff level for all the state systems and each municipality sets its own tariffs.

Investments in the water supply and sewerage sector have been largely financed with federal funds and partly through loans from international agencies such as the World Bank and the Inter-American Development Bank. On average, the federal government has contributed 50% of the funds in the form of grants and loans. Most loans were interest free with repayment periods of 10-20 years, but in practice were not repaid. The loans are channel led through the National Bank for Public Works - BANOBRAS, which is the main financial agency for the sector outside Mexico City.

Since 1976, the Ministry of Human Settlements and Public Works was in charge of planning, construction, supervision, operation and maintenance of water supply and sewerage services in urban centres other than the capital city and in rural areas. In 1980, the responsibility for operation and maintenance of the systems was transferred to the states.

These have created water and sewerage companies to operate and maintain the systems transferred to them. Their scope of responsibilities ranges from those with state-wide responsibility to those responsible for a single system only.

Some systems are still operated by the Municipal Department. For example, the state of Sinaloa has set up an autonomous state water board known as CEAPAS. It regulates and co-ordinates the activities of five semi-autonomous Regional Water and Sewerage Companies, which between them, look after 40% of the systems in the states. Eventually, these companies are expected to own and operate all the

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
43,400	26,800	800	21,500	700	24,000	10,300	2,800
(1985 Actual)					(1985)		
53,100	25,629	16,359	23,284	14,123	24,800	12,542	763
(1990 Targets)					(1990)		
63,962	55,007	3,400	44,773	2,200	26,319	13,300	6,857

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For more information contact: BP Solar Systems Limited, Aylesbury Vale Industrial Park, Stocklake, Aylesbury, Bucks. HP20 1DQ, UK. Tel: 0296 26100 Telex: 838867.

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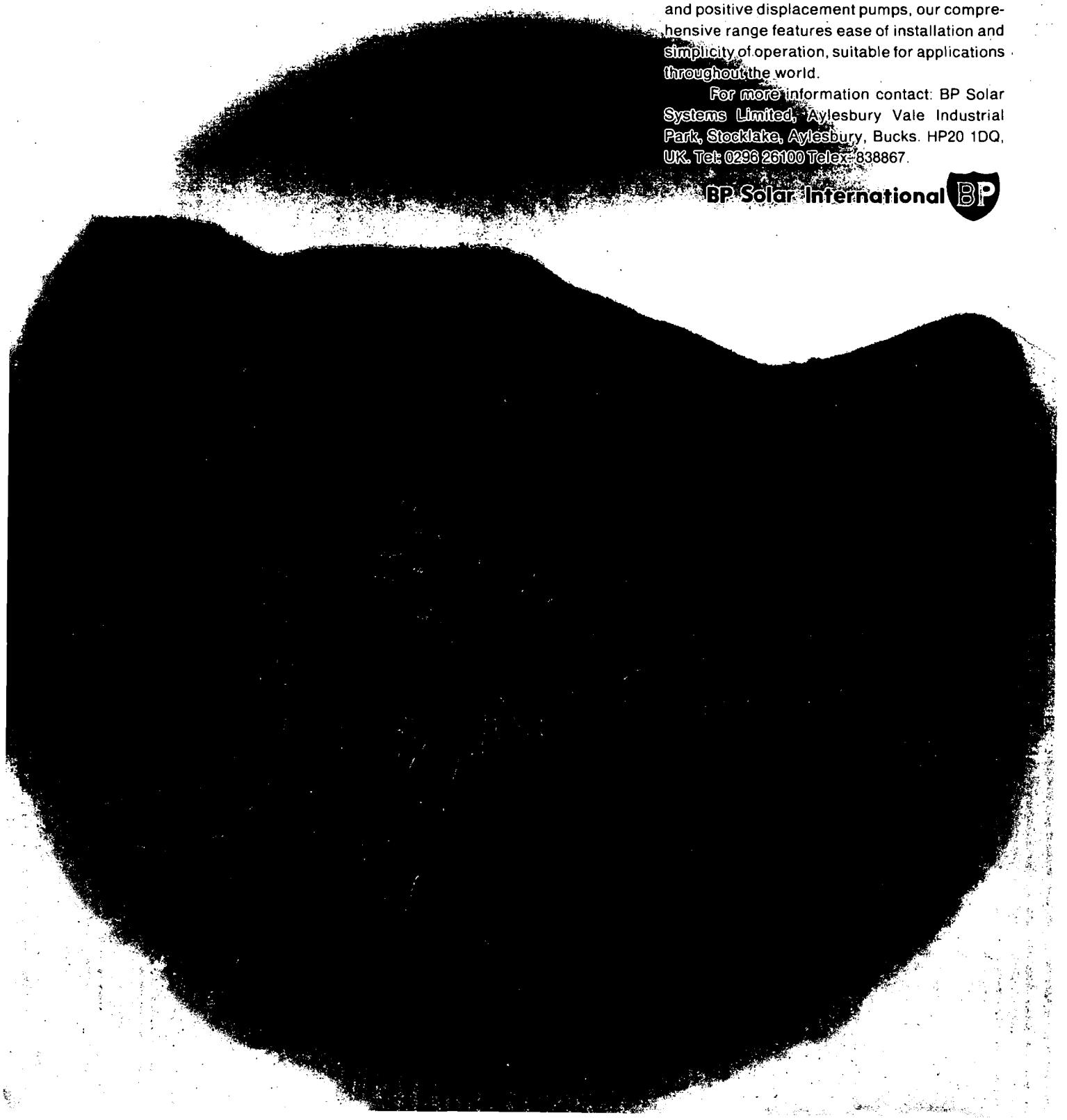


Mexico (continued)

systems in the state under the overall supervision of CEAPAS.

In 1985, 30% of the total population were without safe water and some 51% denied access to safe sanitation. However, the decade plan aims to provide sewer connections in urban areas to 70% of the population, with 3% covered by other means, by 1990. Sanitation services are expected to cover 73% of the urban population by 1990.

In the rural areas, the target is to provide 51% of the population with access to water supplies and to provide adequate sanitation to 26% by the same year.

Main constraints include the need for a national financing instituition for water supply and sanitation schemes, especially to channel funds for schemes in the numerous small and medium towns and the non-metropolitan cities.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
80	80.85	109.43	108.17	81.11	109.52

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
350	150	270	60

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
1.50	0.12	YES

Mongolia

Currency: Tugrik 3.4 = US$1.00
Population: 1,900,000
Official language: Mongolian
Population growth rate: N/A
GNP per capita: $780 (1978)
Life expectancy: 63 years
Infant mortality per 1,000 births: 49
Water diseases per 100,000: N/A
Adult literacy (M/F): 93/8

UNDP resident representative: Microregion 12, House 19, Apt 49, PO Box 49/207 Ulan Bator

WATER AND SANITATION AGENCIES

State Planning Committee

State Committee for Science & Technology

Ministry of Water Economy

Ministry of Health

Ministry of Agriculture

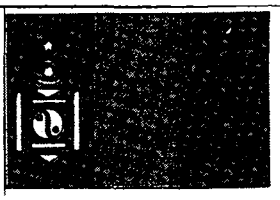
The Mongolian People's Republic covers an area of 1,560,000km^2, divided into 18 *aimaks* (regions) and 316 *somons* (districts). About 42% of the population (1.9 million in 1985) are engaged in agriculture, and 58% in industry, construction, transport and trade.

In 1978, only four towns had piped water supplies: Ulan Bator, Brdenet, Choibalsan, and Darkhan. The fringes of these towns, where people live in tents, were unconnected.

In nine *aimak* centres and 106 *somons*, partial systems for water and sewerage existed. Water tankers supplied the rest.

Individual supplies for separate buildings (schools, hotels, hospitals and public buildings) are common. In some towns up to 40 boreholes equipped with submersible pumps operate.

About 40% of the water resources do not satisfy drinking water standards, because of very high or very low fluoride content and excessive hardness. In 1978 the main drinking water source was untreated groundwater, from 12,626 wells up to 30m deep equipped with hand-operated screw pumps, and 3,632



boreholes fitted with submersibles. Water was commonly boiled before use. River water was used for other domestic purposes.

In the four main towns and nine *aimak* centres, sewage was mechanically treated and the sludge disposed of on infiltration fields or in rivers. There were several underground infiltration systems. In other urban centres sewage was collected in lagoons and periodically transported to land disposal sites.

In 1978 the government had not formulated its plan for the decade. The only statistic available were for consumption of water which varied between 21 litres/person/d in the temporary settlements of nomads to 250 l/c/d in towns.

Industry was said to be developing rapidly, with potential for pollution, and the safe disposal of sewage had not been solved.

Report based on a sector digest dated October 1978. No new information received.

Montserrat

Currency: East Caribbean dollar 2.7 = US$1.00
Population: 13,000 (1977)
Official language: English

WATER AND SANITATION AGENCIES

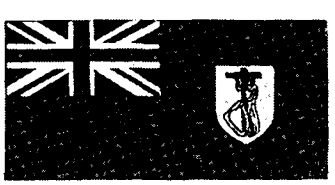
Montserrat Water Authority

A volcanic island, part of the Windward group, Montserrat covers 100km^2 in the West Indies. There is one town, the capital Plymouth.

The Montserrat Water Authority is the responsible body, whose chairman, by statute, is the permanent secretary of the Ministry of Communications & Works.

By 1983, MWA had substantially achieved its objective of ensuring that everyone had an individual piped supply, or access to standposts and public washrooms. About 80% of the population was served by septic tanks and pit latrines, and there were no plans to build sewerage systems.

The principal source of supply is spring water, and the government recognised an urgent need to develop more sources to keep pace with demand, likely to increase dramatically with the development of tourism.



External finance has to be sought for capital schemes to extend and modernise the water system. Tariffs cover the running costs only, being fixed at a sufficiently low level to ensure that minimum health requirements are met.

Report based on a sector digest dated March 1979, and a PAHO/CDB/WHO meeting in June 1983.

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For more information on the JMM Story, please contact Mr. Till Heinsoo, Vice President, 250 North Madison Avenue, Pasadena, California 91101 Telex 67-5420

JAMES M. MONTGOMERY, CONSULTING ENGINEERS, INC. JMM

Morocco

Currency: Dirham 8.37 = US$1.00
Population: 22 million (43.9% urban)
Official language: Arabic
Population growth rate: 2.6%
GNP per capita: US$512
Life expectancy: 61 years
Infant mortality per 1,000 births: 91
Water diseases per 100,000: 11.4
Adult literacy: 65%

UNDP resident representative: Angle Avenue Moulay Hassar et rue Assafi, Casier ONU, Rabat-Chellah, Rabat, Morocco

WATER AND SANITATION AGENCIES

Office National de l'Eau Potable, BP Rabat-Chellah, Rabat
Telephone: 212-81/84
Telex: 31982 PEPRI M

Société Marocaine de Distributions d'Eau, de Gaz et d'Electricité, 20 Boulevard Rachidi, Boite Postale No. 20, Casablanca

Société Nouvelles des Conduites d'Eau, 9, Charii Trabless, Rabat
Telephone: 234-24/305-66/67
Telex: 31028

The mountainous kingdom of Morocco is situated in north-west Africa, bordered by Algeria in the east and Mauritania to the south. In the north, the Rif Mountains extend along the Mediterranean coast. Further south, the Atlas range separates the relatively humid north from the arid south. In the High Atlas, Jebel Toubkal, Morocco's highest mountain rises to 4,165m.

Morocco has a very varied climate which ranges from Mediterranean in the north, with hot summers winters, to Saharan in the southeast with intensely hot summers and hot, drying winds.

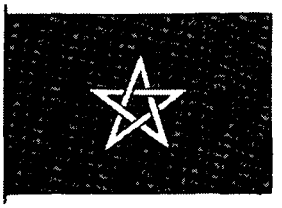
Rainfall is extremely irregular and varies according to season, and according to latitude and altitude. Coastal areas, which lie at the feet of the mountain ranges, receive the most rainfall, and the best watered area is along the Atlantic seaboard north of Agadir and west of the Atlas chain. Summer months, from June to September are normally totally dry.

Since 1980, rainfall has been low, and resources have become depleted. This has caused problems for agriculture on which the economy depends. In some rural areas small aquifers have dried up, and the population has been obliged to migrate to the towns. While most towns have been able to meet demand, some have had to impose water rationing during the dry season to ensure that limited supplies are used to their best advantage.

In 1984, the King created the Conseil Superieur de l'Eau (superior advisory council for water), the main function of which is to monitor the mobilisation and exploitation of the country's water resources. The Council ensures that national plans for water are adhered to and arbitrates in case of disputes about water allocation.

Since its creation, the council has been responsible for the reorganisation of the Administration de l'Eau (water administration); giving increased importance to underground supplies; preparing drinking water sector data; and establishing a water code and quality standards for drinking water.

In recent years, the prolonged drought has led to a general lowering of the water table and a reduction in the principal aquifers.



Lack of water resources is hampering efforts to meet rural water supply targets and it has been necessary to revise planned coverage. The original aim of supplying 50% of the rural population with piped supply by 1990 has been dropped and more realistic objectives for rural areas envisage 20% served by piped supply, 30% served by public standposts, 30% served by supervised water points, and 20% by traditional methods. Local communities are responsible for planning their water supply.

In urban areas, the aim is that 75% of the population should have piped water by 1990 and 90% by 2000. The remaining 25% in 1990 and 10% in 2000 would be served by public standposts. In 1985, 69% of the urban population had a piped supply, although some areas suffered low water pressure and supply cuts as a result of investment delays, or water shortage.

The administration of the urban water sector is quite well organised. Large-scale works and development of resources come under l'Administration de l'Hydraulique which monitors the country's water resources. L'Office National de l'Eau Potable is in charge of overall planning and ensures that water is supplied to urban areas and certain rural centres while the Ministry of the Interior supervises water supply schemes, mainly through local administrative bodies which are responsible for distribution. In many cities, electricity supply and water come under the same agency.

Sanitation is mainly the responsibility of local agencies under

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 7,927	4,915	2,280	2,380	4,430	(1980) 11,408	2,850	1,720
(1985 Actual) 9,680	6,581	3,097	2,900	5,400	(1985) 12,382	3,096	3,395
(1990 Targets) 11,600	8,700	2,900	5,800	6,790	(1990) 13,580	6,790	6,790

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.14	0.09	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	6,050
Investment totals (US $ millions 81-85)	1,460

Morocco (continued)

the supervision of the Ministry of the Interior; but in the area of Grand Casablanca, the water and electricity company is also responsible for sanitation. In urban areas, 85% of the population has means for disposing of wastewater, either through individual sewerage connections, or other methods. The aim is to increase this to serve the entire urban population by 1990. In 1985, effluent from about 5% of the urban population received some form of treatment.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
200	77	N/A	100	115	65

Estimates for rural areas indicate that only 25% of the rural population has adequate sanitation. The target for the Decade is to increase this coverage to 50% of the rural population. The most severe constraints on plans for improved sanitation are insufficient finance and an inadequate system for cost recovery. Lack of trained professional staff and an inadequate legal structure are also serious impediments.

Mozambique

Currency: Metical 404 = US$1
Population: 13.81 million (18% urban)
Official language: Portuguese
Population growth rate: 2.59%
GNP per capita: US$160
Life expectancy: 47 years
Infant mortality per 1,000 births: 147*
Water disease per 100,000: N/A
Adult literacy (M/F): 55/22

*UNICEF, 1985

UNDP resident representative:
Avenue Kenneth Kaunda 931
PO Box 4595 Maputo

WATER AND SANITATION AGENCIES

Ministério de Construção e Águas, Av Karl Marx 606, Maputo.
Telephone: 26081/3
Telex: 6-572

Direcção Nacional de Águas, Av. 25 September 942,9th fl, Maputo.
Telephone: 33031/2
Telex: 6-521

Empresa de Águas de Maputo, Av Eduardo Mondlane 1352, 5th floor, Maputo.
Telephone: 28171/6

Águas de Maputo, E.E. (Saneamento), Av Eduardo Mondlane 1352, 5th fl, Maputo.
Telephone: 27541

UDAAS (Unidade de Direcção de Abastecimento de Águas e Saneamento), Av Eduardo Mondlane 1352, 5th fl, Maputo.
Telephone: 24102

One of the poorest countries in the world, Mozambique has a land area of just under 800,000 km^2. In the south east of Africa it has a lengthy coastline of 2,470km.

An 820km length of the Zambezi river runs through Mozambique, navigable for over half its length and with considerable hydroelectric potential in addition to the existing Cahora Bassa plant.

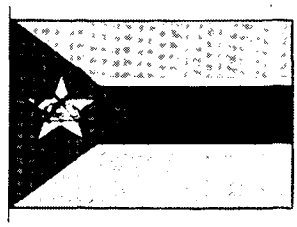
Compared with its land area, Mozambique's population is small Average population density in 1980 was 15 inhabitants per square kilometre, slightly below the norm for sub-Saharan Africa. Mozambique is basically agricultural with 82% of the population living in the rural areas but the urban population is growing rapidly.

Mozambique has common borders with Tanzania, Swaziland, and South Africa. Since independence in 1975 the country has had to deal with increasingly serious insurgency from terrorist groups supported by South Africa, mainly the National Resistance Movement (MNR). Continuous war has. produced serious economic instability and made it impossible for Mozambique to deal with serious drought threatening the country in 1983 and 1984. Thousands died then and millions more faced starvation throughout the country during 1987.

Within this context Mozambique's ability to formulate and carry through Decade plans must remain limited. Nevertheless the country is working to a plan drawn up during 1983, based on calculations of a current coverage level of about 86% of the population having no access to safe water and about 80% without adequate sanitation provision.

Water supply

Decade targets are for 84% urban supply coverage by 1990 and 68% rural coverage. This compares with 1985



levels of service of 38% urban and 9% rural. Of the urban population less than half are supplied by house connections (400,000 in all) and the government plans only to expand this to 650,000 by 1990.

Of urban dwellers 550,000 or 22% are supplied by standpipes and it is planned to increase this to 1,790,000 by 1990.

The estimated 1,000,000 rural dwellers with access to safe water in 1985 represented 9% of the population. The plan envisages increasing this to almost 9,000,000 by 1990.

Sanitation

Decade sanitation targets for 1990 are 69% for urban areas and 58% for the rural areas. This compares with levels of service in 1985 of 280,000 sewerage connections (11% of the population) and 1,050,000 (42%) urban dwellers provided with some other means of excreta disposal. By 1990 it is hoped to increase house connections to 610,000 and supply 1,950 urban dwellers with some other acceptable method of urban excreta disposal, a total coverage of 85%. Only 1,400,000 or 12% of the rural population had access to adequate sanitation in 1985. The Decade plan envisages that this figure would be increased to almost 7,500,000 by 1990.

The cost of achieving these targets has been estimated by Mozambique at US$130.8 million compared with sector investments between 1981 and 1985 of only half that (US$75.5 million, of which 61% was provided from external sources).

Nepal

Currency: Rupee 21.6 = US$1.00
Population: 15,800,000 (6.9% urban)
Official language: Nepali
Population growth rate: 2.66%
GNP per capita: US$1.50
Life expectancy: 45 years
Infant mortality per 1,000 births: 152
Water diseases per 100,000: 4,500 (1980)
Adult literacy (M/F): 39/12

UNDP resident representative: UN Building, Pulchowk, PO Box 107 Kathmandu

WATER AND SANITATION AGENCIES

Department of Water Supply & Sewerage, Ministry of Water Resources, PO Box No. 80, Kathmandu

Water Supply & Sewerage Corporation, Ministry of Water Resources, Tripuresharar Road, Kathmandu

Department of Irrigation Hydrology & Meteorology, Ministry of Water Resources

Ministry of Panchayat & Local Development

Environmental Sanitation Section, Ministry of Health

Ministry of Finance

National Planning Commission

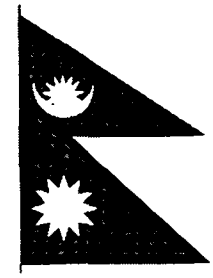
High in the Himalayas, the Kingdom of Nepal is a landlocked country with an area of 147,181km^2 and plentiful water resources. About 9% of the population live in the hills, and 49% in the midlands, watered by perennial streams. In the Terai plains region, where 42% of the people live, rivers are seasonal but deep groundwater is abundant.

Dramatic improvements have been made in the first five years of the decade. From only 6% of the rural population estimated to have safe water in 1980, 25% are now served by piped supplies, mostly from spring sources, and shallow wells with handpumps. The target for 1990 is 66%.

In urban areas, where less than 7% of the population live, the level of coverage appears to be static at about 70%, just keeping pace with urban growth. About 250,000 more people in towns than in 1980 are now served by either a piped supply or a standpipe.

Sanitation has improved significantly in towns, as a result of externally funded projects to extend sewer systems. The level of service provided by sewers is still low, however, at 16% now compared to less than 5% in 1980. Over the same period the proportion of the urban population using household systems is reported to have declined from 9% to only 1%.

No progress has been made in rural sanitation in the first five years of the decade. The figures actually show a real decrease in the number of people with a sanitary disposal facility, but this is probably due to more accurate reporting.



The National Planning Commission has steering and technical support committees to coordinate efforts in the sector. The Water Decade Plan, prepared in 1980, envisaged 63% water coverage and 12% sanitation provision by 1990. These targets have been reviewed to 69% and 14%.

It is estimated to cost $270M to reach these targets, in addition to the $62M investment already made. More than half of the funding is external: $35M has been contributed in the first five years from the International Development Association ($22.9M), the World Bank, the Asian Development Bank, the European Economic Community, various UN organisations, and the bilateral agencies of Canada, France, the United States, West Germany, and the UK.

Total investment in the sector so far is just above target (4.7% of the total budget compared to 4.6% planned). The $270M planned investment for the five years until 1990 will be spent on rural water supply ($167.8M), urban water supply and sanitation ($85.3M), and rural sanitation ($17.3M).

Netherlands

Currency: Guilder DFl 2.7 = US$1.00
Population: 14,500,000 (88% urban)
Official language: Dutch
Population growth rate: 0.38% (1983)
GNP per capita: $9,290*
Life expectancy: 77 years*
Infant mortality per 1,000 births: 8**
Water diseases per 100,000: N/A
Adult literacy: N/A

*World Bank (1985)
**UNICEF (1985)

WATER AND SANITATION AGENCIES

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Miliebeheer (Ministry of Housing, Planning & the Environment) Directorate Drinking Water Supply, Van Alkemadelaan 85, 2597 AN The Hague, Netherlands
Telephone: +31 (70) 264201
Telex: 34429 VORO NL

Vereniging van Waterleidingbedrijven in Nederland (VEWIN), (Netherlands Association of Water Supply Companies) Sir Winston Churchillaan 273, 2288 EA Rijwijk
Telephone: +31 (70) 953535

Ministerie van Verkeer en Watersataat, Postbus 17, 8200 AA Lelystad
Telephone: +31 (3200) 4 08 74
Telex: 40600

UNIT COSTS OF WATER PRODUCTION (DFl/m³)		
Average cost	Operation average water tariff	Progressive water tariff
1.25	1.25	NO

Of the 1,093M.m³ of drinking and service water supplied by waterworks in the Netherlands in 1983, two-thirds was ground water and one-third came from rivers and lakes.

The average total annual rainfall excess that replenishes the existing groundwater resources is about 5,000M.m³. Allowing for environmental and agricultural requirements, nearly 2,000M.m³ remains for extraction by waterworks and industry. The total amount extracted by water companies is now about 700M.m³ and by industry about 345M.m³.

The government issues long-term planning directives on water supply in the form of structural schemes. The water authorities are then expected to produce a progressive ten-year plan based on capacity planning, indicating the requirements for capacity and the demand for raw ground and surface water.

Overseen by the Netherlands Waterworks Association (VEWIN), the waterworks' plans are periodically adjusted to ensure that the planning of extraction, production and transport facilities keeps in step with the developing demand for drinking and industrial water supply.

When preparing the ten-year plans, VEWIN members act in close cooperation with the Drinking Water & Industrial Water Supply Department of the Ministry of Housing, Planning & Environment, the Ministry of Ways & Works and all provincial conservancy and planning authorities.

In 1985, just under 3M.m³/d of water was supplied throughout the Netherlands, which is estimated to rise to 3.4M.m³/d in 1990. The entire population was provided with a potable water supply, with only 20,000 people from a population of 14.5 million not supplied via house connections.

A slightly lower percentage was served by connection to public sewers, leaving 720,000 served by household systems such as septic tanks. Some 88% of the nation's wastewater received primary and or secondary treatment, while only 12% was discharged to rivers and estuaries without treatment. By 1990, the amount of sewage treated is estimated to rise from 2.7M.m³/d in 1985 to 3M.m/d, with the total discharged estimated at 3.2M.m³/d.

Total per-capita water consumption in 1981 was 108 litres/day, which is estimated to rise to 117 l/d in 1990, 122 l/d in 2000 and 126 l/d in 2010.

Average cost per capita of providing urban water supply through house connections in 1985 was DFl 1,000. Urban sanitation cost double this, while rural sanitation cost DFl 3,000.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
- 117 -		- 108 -	

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
12,400	N/A	N/A	N/A	N/A	1,700	N/A	N/A
(1985 Actual)					(1985)		
12,800	12,774	26	11,776	1,024	1,700	N/A	N/A
(1990 Targets)					(1990)		
		N/A				N/A	

UNIT COSTS OF CONSTRUCTION (DFl PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
1,000	-	2,000	-	1,000	3,000

New Caledonia

Currency: Franc 6.1 = US$1.00
Population: 138,000 (42% urban) (1980)
Official language: French
Population growth rate: 1.81% (1980)
GNP per capita: US$7,150 (1980)
Life expectancy: 69 years (1980)
Infant mortality per 1,000 births: 27
Water diseases per 100,000: 1,200
Adult literacy: 89 (1980)

WATER AND SANITATION AGENCIES

Service des Eaux, Mairie de la Ville de Nouméa, BP 886 Nouméa.

A French Overseas Territory, New Caledonia has a land area of 19,100km^2 and a population of 138,000 (in 1980), 42% of which was urban.

Almost everyone in the towns had a safe water supply by house connection in 1980, but only 17.5% of the rural population was estimated to have access to satisfactory supplies.

Sewer systems served 76% of households in the towns, and the remainder had household systems of waste disposal. In the rural areas only 51.5% had adequate sanitation.

The government had established a partial decade plan by 1980, and was reported to be preparing a full version. It was envisaged that all the projected 70,000 1990 urban population would have household connections for water supply and adequate sanitation, although whether by sewers or septic tanks was not specified. It was hoped to provide 95% of the projected 97,000 rural population with safe water by 1990. No target was set for rural sanitation.

The cost of providing an urban water supply was estimated as $340 per person in 1980. No figures were available for rural water supply or sanitation (urban or rural). The cost of producing water was put at $0.1/m^3, against an average tariff operating in 1980 of $0.18/m^3. However, cost recovery was said to be inadequate. Other constraints listed were inadequate legal and institutional frameworks and shortage of trained staff at all levels.

External finance has come from the European Development Fund and Caisse Centrale de Coopération Economique. The EDF granted $1.2M in 1983 for drinking water systems using boreholes and submersible pumps on the three Loyalty islands, Lifou, Mare, and Ouvea.

Report based on a sector digest dated December 1980.

Nicaragua

Currency: Cordoba 70 = US$1.00 (official rate)
Population: 3.3 million
Official language: Spanish
Population growth rate: 3.4%
GNP per capita: $770
Life expectancy: 59 years
Infant mortality per 1,000 births: 104
Water diseases per 100,000: N/A
Adult literacy: 87

UNDP resident representative: Apartado Postal 3260, Managua

WATER AND SANITATION AGENCIES

Ministerio de la Salud (MINSA), Apartado 107, Managua.
Telephone: 97150
Telex: 2042 MINSA

Instituto Nicaraguense de Acueductos y Alcantarillados (INAA), Apartado 968 or 3599, Managua.
Telephone: 51204/51414
Telex: 1344 INAA

Instituto de Recursos Naturales y del Ambiente (IRENA), Apartado 5123, Managua.
Telephone: 31110/31111
Telex: 1328 IRENA

The Central American Republic of Nicaragua lies across the isthmus, with the Pacific Ocean to the west and the Caribbean Sea to the east. The country has a land area of 148,006km^2, topographically dividing into three distinct zones: the Pacific coastal plain has an altitude varying from 200m to 500m north to south. There is also a volcanic chain about 300km long with some of the highest peaks reaching 1,750m. The area comprises the Nicaraguan Depression which accomodates major lakes.

The Central and Northern zone is a varied region of high plains, tablelands, hills and valleys and a mountain chain ranging from 500m to 2,000m in altitude. It comprises one third of the country's land area.

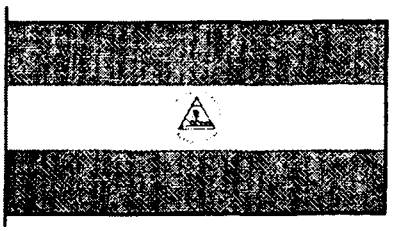
The Atlantic Zone is a densely forested low-lying plain; rainfall varies from 800mm to 6,300mm.

In an average year, some 280,000M.m^3 of rain falls on the country. Lake Nicaragua in the country's southwest discharges into the Caribbean via the San Juan river. It is the largest lake in Central America.

In 1985, 52% of the total population were without safe water supplies. Some 1.3 million urban dwellers, or 69% of the urban population, had drinking water by house connection and 7% had supplies by standpost. Sewer connections were used by 35% of the urban population.

In the rural areas, 11% of the population have water supply; statistics for sanitation services in rural communities are not available. Nevertheless, diarrhoeal disease remains the principal cause of death for infants in the first five years of life and the Nicaraguan authorities are fully aware of the need to improve levels of service in the water sector to improve health care.

However, without adequate facilities to test water quality, it is not possible to decide which communities are at greatest risk from contaminated supplies. Thus, INAA, the Nicaraguan



national water authority is establishing a network of regional laboratories to undertake routine water testing and sanitary inspection visits.

Water supply and sanitation coverage targets for the Decade are not available. In the water sector, responsibilities fall to six agencies: INAA works on planning, studies, design, construction, financing and administration of water supply and sanitation systems on a national scale; MINSA, the Health Ministry, has responsibility for planning, negotiation of loans, construction, financing and maintenance of urban and rural sanitation systems; INTER, the Institute of Territorial Studies, conducts groundwater prospecting and exploitation, while IRENA, the Institute of the Environment and Natural Resources, controls and monitors water quality. The Fondo Internacional para la Reconstruccion is responsible for negotiating foreign credits.

The greatest development constraints include a lack of finance, insufficient hydrological data, inappropriate technology, insufficient health education and logistics problems.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
1,459	984	344	504	N/A	1,273	124	N/A
(1985 Actual)					(1985)		
1,884	1,300	132	659	N/A	2,075	228	N/A
(1990 Targets)					(1990)		
		N/A				N/A	

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.14	0.38	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	157
Investment totals (US $ millions 81-85)	54

Niger

Currency: CFA Franc 307 = US$1
Population: 6,115,000 (16% urban)
Official language: French
Population growth rate: 2.77%
GNP per capita: US$258
Life expectancy: 44 years
Infant mortality per 1,000 births: 158
Water diseases per 100,000: N/A
Adult literacy (M/F): 19/9

UNDP resident representative: Maison de l'Afrique BP 11207 Niamey

WATER AND SANITATION AGENCIES

Ministère de l'Hydraulique et de l'Environnement, BP 257 Niamey.
Telephone: 72 38 89
Telex: 5509

Ministère des Travaux Publics et de l'Habitat, Direction de l'Urbanisme, BP 669, Niamey

Ministère du Développement Rural, BP 346 Niamey.

Ministère de la Santé Publique et des Affaires Sociales, Direction Infrastructure Sanitaire, Niamey
Telephone: 72 28 85
Telex: 5533

Office des Eaux Sous-Sol (OFEDES), BP 734 Niamey.
Telephone: 73 23 44
Telex: 5313

Société Nigérienne d'Electricité (NIGELEC), BP 202 Niamey.
Telephone: 72 26 92/6
Telex: 5224

This land-locked desert republic is listed by the UN as one of the world's least developed countries. Niger covers 1,267,000km^2 of the Sahara and the Sahel, and relies for its water on the river Niger crossing its southwest corner, and ungenerous groundwater resources.

Most (84%) of Niger people live in more than 8,000 scattered villages, and 8% of the rural population is nomadic. There are 42 urban centres with more than 5,000 inhabitants.

Some 90% of the population works in agriculture or livestock, which, together, in 1980 accounted for 40% of the GNP.

Malaria, gastroenteritis, and schistosomiasis are endemic, and life expectancy is 44 years. The infant mortality rate of 158 per 1,000 births has increased slightly from the 1980 figure (140). Literacy has improved in the same period from 10 to 14 adults in every 100.

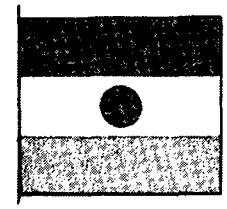
Decade progress

The most significant improvement has come in rural water supply, where nearly half the population is within reach of a safe source now, compared with less than a third in 1980. No figures are available on rural sanitation, which was available to only 3% of the rural population in 1980.

In the towns, increases in the level of supply have failed to keep pace with a trend towards urbanisation, and only 35% of townspeople have a safe water supply now compared with 41% in 1980.

Although the decade objectives envisaged connecting 20% of urban households to a sewer by 1990, none has so far been built. There is no information on the provision of other means of urban sanitation, which in 1980 served 36% of towns.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
75	25	45	20



Responsible agencies

The Société Nigérienne d'Electricité (NIGELEC), operating under the Ministère de l'Hydraulique et de l'Environnement, is responsible for water supply in the major urban centres, with secondary centres provided for by their own Local Authorities.

The Office des Eaux du Sous-Sol (OFEDES), under the same ministry, is in charge of the construction and maintenance of boreholes and wells in rural areas. It also undertakes hydrogeological research and supports water supply infrastructure.

The Division de l'Hygiène et de l'Assainissement (DHA) under the Ministère de la Santé Publique et des Affaires Sociales is charged with environmental protection, while the Service Central de l'Assainissement, under the Ministère des Travaux Publics, has responsibility for planning, designing and building storm drains, sewers, and organising garbage collections.

There is a serious lack of qualified personnel in the water sector, and no training budget to remedy it. There are currently 120 staff in technical grades, and 66 artisans.

There is no up to date information on investment needed to complete the decade objective, which is to provide complete access to at least a satisfactory supply, and 35 l/day per head in rural areas. In 1980 it was estimated that $600M was needed for water supply, and $386M for sanitation. So far 7.3% of that sum has been spent.

In 1980, 35% of the rural population participated in planning projects, but only 17% in building and maintaining them. Later figures are not available.

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 701	203	83	0	252	(1980) 4,833	1,547	145
(1985 Actual) 991	247	102	0	—	(1985) 5,124	2,494	N/A
(1990 Targets)		N/A			(1990)	N/A	

Nigeria

Currency: Naira 4 = US$1.00
Population: 97.29 million (26% urban)
Official language: English
Population growth rate: 2.77%
GNP per capita: US$730 (1984)
Life expectancy: 65 years
Infant mortality per 1,000 births: 170
Water diseases per 100,000: 28
Adult literacy (M/F): 54/31

UNDP resident representative: 11 Queen's Drive, Ikoyi, PO Box 2075 Lagos

WATER AND SANITATION AGENCIES

Ministry of Agriculture, Water Resources & Rural Development, Lagos.

National Electric Power Authority (NEPA), 17 Awolowo Road, Ikoyi, Lagos.

The most populous African nation, Nigeria occupies 994,714km^2 on the Gulf of Guinea. Bordered by Benin in the west, Cameroun in the east, and Chad and Niger in the north, the country has varied topography and climate, ranging from tropical rain forests in the south, through Guinea and Sudan savannah to Sahel in the north.

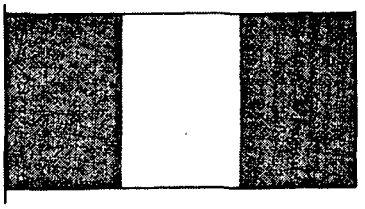
Institutional organisation

Administratively Nigeria is governed federally, with 19 states plus the Federal Capital Territory (Abuja) having their own ministries of agriculture and parastatal agencies for water supply. Federal ministries often carry out projects in the states semi-independently of the state authorities, and in particular operate the river basin development authorities. Eleven RBDAs covering the major catchments were reorganised into 19 in 1984 to correspond to the states.

Urban water supply for state capitals and larger towns falls to a parastatal water board or corporation. Village water supplies were traditionally administered by ministries of local government & cooperatives, which were always short of manpower and financial resources.

The federal Ministry of Agriculture, Water Resources & Rural Development part finances, with the World Bank and the states, integrated agricultural development programmes, which always include a rural water supply component. Almost every state has an ADP, and those in the north which have been running since the early 1980s - Sokoto, Kano, Kaduna, and Bauchi - are statewide. Thousands of boreholes have been drilled for ADPs, but only recently has provision been made for maintenance.

The present government which came to power in August 1985 is more committed to agriculture than its predecessors, as part of its policy of reducing dependence on oil. Before oil, agriculture accounted for half of the gross domestic product and 75% of exports. Now (1987) only 2.5% of exports are agricultural. Part of the sectoral reform has been the abolition in January 1987 of commodity boards for cocoa, coffee, palm produce, rubber, cotton, groundnuts and grains. Small farmers incomes have risen dramatically with the removal of the corrupt and moribund purchasing monopolies.



However, the government still has to tackle the confusion of federal, state and parastatal authorities working independently. In Bauchi for instance, seven agricultural agencies perform similar functions.

Water supply situation

The following account comes from the Nigerian Institute of Social & Economic Research,* which carried out field work in 1983 and 1984.

It is estimated that in the rural areas of Nigeria, between 40 and 48% of the population depends on wells, 35% on springs and streams, and only 20% have a piped water supply. In all states, 80 to 90% of the effort is geared to towns.

About 300 urban centres had a piped water system in 1984, but only three (Kaduna, Jos, and Port Harcourt) served more than 70% of the town with private connections. Lagos, Enugu, Minna, and Owerri achieved between 50 and 70%. However, these figures disguise the water rationing that is universal, with regular disruptions to supply, often because of power failures. Illegal water connections are common, often carried out by unskilled plumbers causing a high leakage rate.

The state water agencies have been unable to keep pace with the growth of towns and cities, where 23% of the population now live. Urban sanitation and drainage face similar problems, with stormwater drains acting as open sewers in many cities.

Rural sanitation is the subject of a number of public health campaigns being undertaken by UNICEF, and the newly-created Directorate of Food, Roads & Rural Infrastructure is responsible for rural health programmes.

**K Adeniji: "State Water Agencies and the Crisis of Urban Water Supply in Nigeria."*

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
85	18	N/A	N/A	28	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
120	60	63	25

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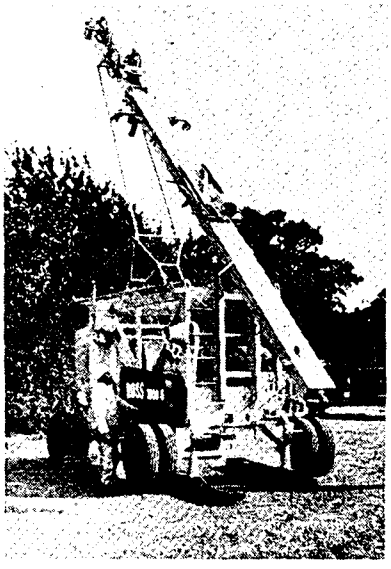

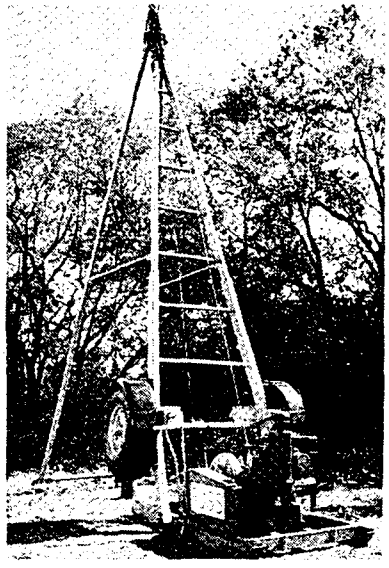

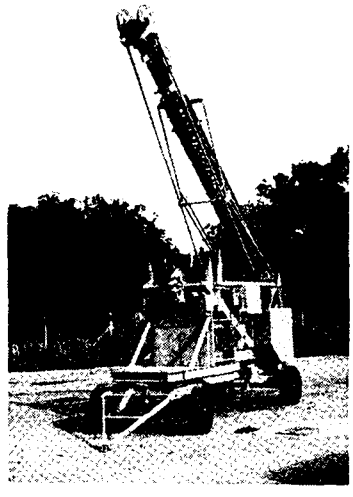

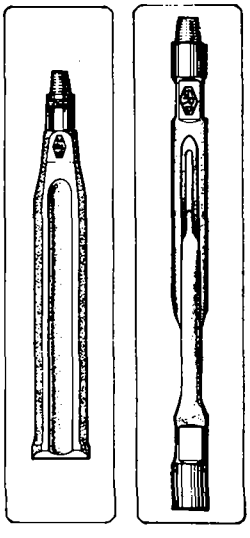

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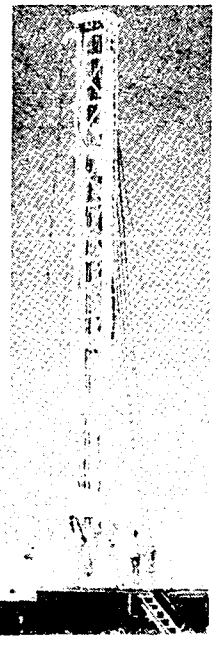

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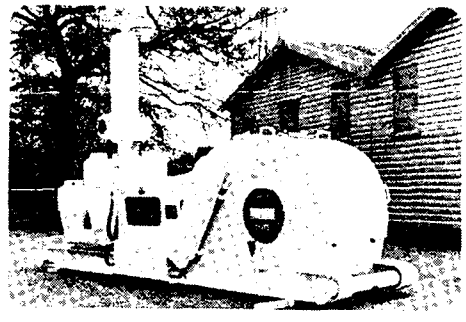

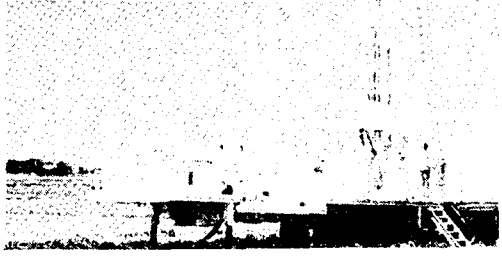

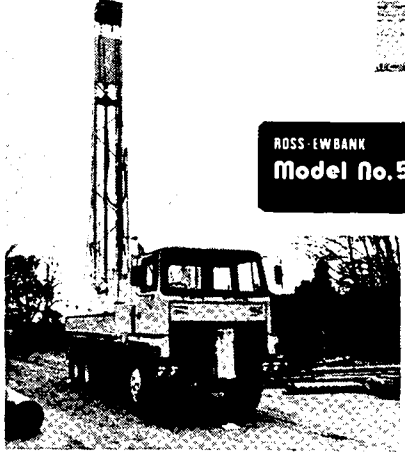

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Norway

Currency: Krone 6.84 = US$1.00
Population: 4.146 million (70% urban)
Official language: Norwegian
Population growth rate: N/A
GNP per capita: $14,370*
Life expectancy: 77 years*
Infant mortality per 1,000 births: 8**
Water diseases per 100,000: N/A
Adult literacy: N/A

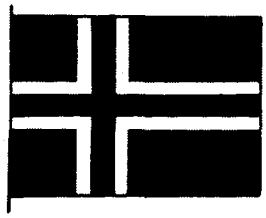
*World Bank (1985)
**UNICEF (1985)

Every urban home in Norway in 1985 was connected to the public water supply network, together with another 60% of the population rural areas. The remainder of the rural population were supplied through private sources such as wells or springs.

No current figures are available for total drinking water supplied, but in 1980 this figure totalled 1.9M.m^3/d.

In 1985, 4% of the urban and 11% of the rural population still lacked a proper excreta disposal system, while another 4% in each category only had access to latrines.

The proportion of urban population connected to a public sewerage system was about 70% in 1985 with another 22% having a private sanitation system such as a WC plus a septic tank. In rural areas, only 40% of the people were connected to a sewerage system with another 45% using a private excreta disposal system.



Some 164 of Norway's sewage in 1985 received no treatment at all. The majority of this raw sewage (60%) was discharged to rivers, while another 16% was discharged into the sea. Approximately 20% was disposed of in lakes or lagoons, while 4% was put on the land.

Some 70% of sewage was treated to secondary standard, while 14% received primary treatment only.

WATER AND SANITATION AGENCIES

Statens Institutt for Folkehelse (National Institute of Public Health), Getmyrsvn 75, N-0462 Oslo 4
Telephone: +47 (2) 35 60 20
Telex: 72400 FOTEX N

Norwegian Institute for Water Research (NIVA), Postboks 33, Blindern, N-0313 Oslo 3
Telephone: +47 (2) 23 52 80
Telex: 74190 NIVA N

Directorate of Public Health, Postboks 8128 Dep, N-0032 Oslo 1
Telephone: +47 (2) 41 90 10

National Pollution Control Authority, Postboks 8155 Dep, N-0033 Oslo 1
Telephone: +47 (2) 65 98 10
Telex: 76684 SFT N

Oman

Currency: Omani Rial 0.385 = US$1.00
Population: 1,500,000 (23% urban)
Official language: Arabic
Population growth rate: 3.10%
GNP per capita: $6,730*
Life expectancy: 50
Infant mortality per 1,000 births: 25
Water diseases per 100,000: N/A
Adult literacy: N/A

*World Bank (1985)

UNDP Resident Representative: House no 20, Road 10, Medinat Qaboos (West), PO Box 5287, Muscat, Sultanate of Oman

WATER AND SANITATION AGENCIES:

Ministry of Electricity and Power

Public Authority for Water Resources

Ministry of Health, Council for Conservation of Environment and Prevention of Pollution

Stony wadis, scrub vegetation and barren, rocky mountains characterise Oman, which is located on the south-eastern margin of the Arabian peninsula. The climate is hot, and temperatures can reach 49°C in the desert. Rainfall is sparse, but heavy when it does occur.

The government places a great deal of emphasis on water development and spent $330M on water resources ($40M on drilling) during the 1980-85 Five Year Plan.

Of this, $185M was allocated to the Ministry of Electricity & Water which is responsible for supplying water for domestic and industrial use in the capital and regional towns, except for those in Dhofar province.

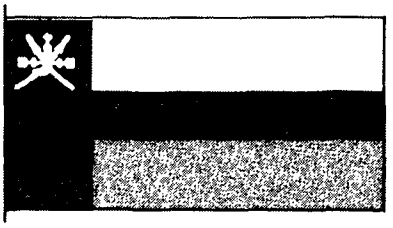
In mid-Decade (1985), 60% of the urban population had private water connections and 40% were served by other means, for example standposts supplied by bowsers. Over 65% of the rural population had reasonable access to water supply.

The Public Authority for Water Resources is exploring the potential of groundwater supplies and water from the dolomite aquifer underlying the Greater Capital Area is used to supplement desalinated water from a recently-expanded desalter. Under the current Five Year Plan, small-scale desalination plants are to be commissioned in rural areas; and work is continuing on improving and/or building 239 wells in remote parts of the country.

Dhofar province in the South has been allocated $50M for water supply development and wells drilled in the mountain region have indicated a large reservoir of underground water. Extensive reserves have also been found in the north west and western areas of the country.

Small dams, designed to hold back rainwater following short but heavy rainfall, are being built to allow the water to seep into the ground and recharge the aquifers.

Water quality control is coordinated by numerous government agencies including: The Ministry of Health, Council for Conservation of Environment and Prevention of Pollution (CCEPP), the Capital Municipality and the Ministry of Electricity and Water. The Ministry of Environment is responsible for monitoring pollution and enforcing regulations drawn up CCEPP.



The Ministry of Health (Environmental Health Section) carries out routine sampling of all water supplies, including well water, and bottled mineral water in order to ensure that the National Health Standard for Drinking Water is met. The Ministry of Health also follows up cases of waterborne illness to eliminate sources of contamination.

Manpower shortage is one of the main constraints hampering development of the water and sanitation sector. Environmental health officers, laboratory technicians, public health educators and social (health) workers to develop community participation are all needed.

Pilot studies using health services staff to educate communities and to encourage participation in water/sanitation projects were proposed at the 4th National Conference held in December 1985.

Despite lack of manpower, the Ministry of Health has increasingly used television to educate the public, although this method does not serve communities in remote areas. Posters are also used for public information.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)	N/A				(1980)	N/A	
(1985 Actual)					(1985)		
340	275	31	268	31	1,160	568	290
(1990 Targets)					(1990)		
400	400	0	380	0	1,350	810	540

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
250	45	220	35

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	1.15	NO

Pakistan

Currency: Rupees 17.308 = US$1.00
Population: 93,800,000 (29% urban)
Official language: Urdu
Population growth rate: 3%
GNP per capita: $390
Life expectancy: 55
Infant mortality per 1,000 births: 80
Water diseases per 100,000: 315
Adult literacy (M/F): 40/19

UNDP resident representative: Block no 2, Diplomatic Enclave no 1, Sector Ramma, (PO Box 1051), Islamabad, Pakistan.

WATER AND SANITATION AGENCIES

Federal Ministry of Planning & Development, P Block, Islamabad
Telex: 5171 PLAN

Ministry of Power & Natural Resources, A Block, Islamabad
Telex: 5714 POWER

Water & Power Development Authority, WAPDA House, Shahrah-e-Quaid-e-Azam, Lahore
Telex: 44869 WAPDA PK

Karachi Water Supply & Sewerage Board, Water House, MR Kayani Road, Karachi

Bordered to the north by the Himalayas, the Karakorams and the Hindukush, and to the south by the Arabian Sea, Pakistan is an arid country, composed mainly of mountain and desert.

Rain, which falls mainly between July and September, depends on the monsoon and varies from barely 130mm/year in Upper Sind (where temperatures of 52°C were recorded in 1984) to 1,250mm in parts of the Himalayan mountain region. Evaporation varies from 1,250 to 2,800mm in a year.

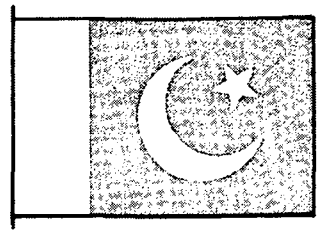
Without irrigation, Pakistan would be barren. The Indus plain, where most people live and most food is produced, receives less than 150mm of rain a year but the 60,000km Indus irrigation canal irrigates 12M.ha of fertile land. In spring and early summer when snows melt in the high mountain ranges of the north, river discharges rise dramatically. Drinking water supplies are drawn from both ground and surface sources and rainwater is collected in the arid zones and dry, hilly regions.

Pakistan has frontiers with Iran, Afghanistan, China and India and is divided into four provinces, Baluchistan, North West Frontier Province, Punjab and Sind. The Federal Capital Territory of Islamabad, the Federally Administered Tribal Areas and the Northern Areas are administered by the Federal Government which also has responsibility for Azid Jammu and Kashmir.

Sector responsibilities

Three tiers of Government - federal, provincial and local are involved in water and sanitation programmes. The federal government is responsible for overall development planning reflected in National Development Plans prepared by the National Planning Commission, in close consultation with the provinces.

The Environment & Urban Affairs Division looks after overall environmental health programmes of the country, including water and sanitation in urban areas; and the Rural Development Division deals with water supply



and sanitation in rural areas. At present, the Ministry of Planning & Development coordinates the efforts of the sector at federal level.

Implementation, operations and management are the responsibility of:
- Larger cities - Development Authorities through their water and sewerage agencies;
- Medium towns - Provincial Public Health Engineering Departments;
- Rural areas - Piped systems: Provincial Public Health Engineering Departments; Handpumps: Local government departments and local organisations.

Operation and maintenance is the responsibility of water and sewerage agencies, public health engineering departments and other local organisations.

Decade plan

During the Decade 1981-90, the overall population is expected to grow at an average rate of 2.64% a year and the projected total population in 1990 is 107.10 million, with 33% living in urban areas and 67% in rural. At present, Pakistan is also looking after about four million refugees, most of them from Afghanistan.

At the start of the Water Decade, Pakistan set a 100% target for urban water supply but it was acknowledged that this could not be achieved in rural areas. In 1981, rural coverage was only 18% and the aim is to increase this to 66% by 1990. Coverage of the 45,000 villages is proposed through installation of 260,000 handpumps, storage reservoirs, shallow wells and piped water supply schemes.

Urban sanitation coverage is planned to increase from about 42% to 65% by 1990. Rural sanitation, available to only 2% of the population in 1981, may, with maximum effort, be extended to 13% of the rural population by 1990 through use of surface drains and pit latrines.

In mid-Decade (1985 figures), potable water supply was available to about 43% of the population (83% in urban and 26% in rural areas) while sewerage/sanitation of an acceptable standard was provided for about 20% (51% in urban and 6% in rural areas).

Targets for the Sixth Five Year Plan (1983-88) are: Water Supply: Increase overall coverage from 38% in 1983 to

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
23,700	7,100	9,900	10,000		60,100	12,000	1,000
(1985 Actual)					(1985)		
26,900	22,282		13,800		66,900	18,094	4,020
(1990 Targets)					(1990)		
34,200	34,200		22,230		77,300	51,018	11,595

Pakistan (cont.)

59% in 1988 (urban areas from 78% to 90% and rural areas from 22% to 45%); and Sewerage/Drainage: Increase overall from 17% in 1983 to 26% in 1988 (urban areas from 48% to 60% and rural areas from 4.5 to 10%).

Government has allocated $400M to the sector under the Sixth Plan - about 1.5 times the amount previously spent under the Fifth Plan. Additional resources will be allocated to Special Development Programmes in Karachi and Baluchistan for which funds from international agencies such as the World Bank, Asian Development Bank, Kuwait and ECC countries will also be available.

To coordinate Decade activities, the government has established a committee within the existing Central Development Working Party which is headed by the Secretary General, Federal Planning and Development Departments and other Federal/Provincial Division/Departments concerned with implementation of the water supply and sanitation programme.

A multi-faceted approach to the problem of lack of trained manpower is being followed. The Institute of Public Health Engineering, Lahore, is increasing the number of graduates in public health engineering; the University of Karachi will start a Masters Programme in environmental engineering; Lahore College of Technology is studying the feasibility of establishing a school to train skilled technicians at middle management level in water supply, sewerage and drainage.

A pilot programme is underway in 184 rural primary schools to train instructors who will in turn train the students in basic hygiene, public health, water supply/sanitation. Adequate safe drinking water and sanitation facilities will be provided at each of these schools to compliment the software training.

The Federal Ministry of Planning and Development has appointed consultants to develop National Standards for optimal quality/quantity for water supply, sewerage and drainage in both urban and rural areas. A national Decade Plan has been prepared with funding assistance from WHO.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
40	N/A	45	N/A	30	15

Panama

Currency: Balboa 1 = $1
Population: 2.2 million
Official language: Spanish
Population growth rate: 2.2%
GNP per capita: $2,100
Life expectancy: 72 years
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: N/A
Adult literacy (M/F): 89/88

UNDP resident representative: Apartado 6314, Panama 5

WATER AND SANITATION AGENCIES

Instituto de Acueductos y Alcantarillados Nacionales (IDAAN),
P.O. Box 5234, Panama, 5
Republic of Panama
Telephone: +507 23-8640
Or to the Executive Director
Telephone: +507 64-9230 & 23-7519

Instalaciones Sanitarias S.A.
P.O. Box 9920, Panama, 4
Republic of Panama
Telephone: +507 25-1109 & 25-4725

The Republic of Panama, which covers 74,009km^2, lies at the narrowest part of the Central American isthmus with Colombia to the south. The Cordillera Central is the most dominating topographical feature in the country, with its highest peak reaching to 3,475m.

The country has a dry winter season from January to April, with a wet summer during the rest of the year. Annual rainfall averages 1,800mm.

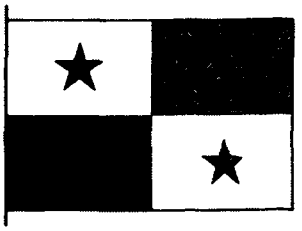
The Panama Canal Zone, a strip of land 82km long and 16km wide on either side of the Canal is leased to the USA, but Panama is to have control over the Zone by the year 2,000.

In 1985, 20.4% of the total population were without safe water and 19.2% were without safe sanitation. In the same year, a million people living in urban areas, or 95% of the total urban population, had drinking water supplies by house connection and 50,000, or 5% by standpost. In terms of sanitation, 73% of the urban population had sewer connections and 27% had sanitation services by other means.

In the rural areas, 63% of the population had water supplies and 61% had adequate sanitation.

Decade plan

For the Water Decade, Panama is aiming to supply 100% of urban dwellers with potable water by water connection; sewer connections should be provided to 85% of the urban population, with 15% having sanitation services by other means. In the rural areas, plans are to supply 85% with access to safe water and 63% to be covered by adequate sanitation services.



Institutionally, master planning comes under the Ministerio de Planificación y Politica Economica (MIPPE), while the Instituto de Acueductos y Alcantarillados Nacionales (IDAAN) handles general planning, loans negociations, water quality, project preparation, construction and administration of urban water supply and sewerage systems. The Health Ministry (Ministerio de Salud), is concerned with planning and finances for water supply and sanitation in rural areas, in collaboration with the receiving communities. Local communities run rural water supply systems, while design, construction and inspection of rural works is undertaken by IDAAN.

Main development constraints include: the gap between production costs and tariffs; lack of trained personnel; and problems of operation and maintenance.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 900	838	62	556	N/A	(1980) 925	602	261
(1985 Actual) 1,085	1,035	50	790	295	(1985) 1,056	670	645
(1990 Targets) 1,176	1,176	0.0	1,000	430	(1990) 1,200	305	750

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
125	N/A	235	N/A	80	15

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.07	0.29	YES

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
300	150	277	184

Papua New Guinea

Currency: Kina 0.9038 = US$1.00
Population: 3,343,000 (13% urban)
Official language: English
Population growth rate: 2.30%
GNP per capita: US$649
Life expectancy: 49.60 years
Infant mortality per 1,000 births: 72
Water diseases per 100,000: 2,724
Adult literacy (M/F): 55/35

UNDP resident representative: Musgrave Street, Credit House, PO Box 1041, Port Moresby

WATER AND SANITATION AGENCIES

The Bureau of Water Resources, Department of Mineral and Energy, PO Box 352, Konedobu

The total land area of Papua New Guinea is 462,840km^2. It is the eastern half of New Guinea island, the western half being an Indonesian Province of Irian Jaya. Rainfall varies from 80mm to 450mm/year.

A national policy for rural water supply and sanitation was drawn up in 1984 and formed the basis for the Water Supply Chapter in the Papua New Guinea Health Plan. The target set was to achieve the provision of safe water and sanitation facilities to 80% of the total population by 1990.

A system of monitoring is being set up as many projects which were or have been implemented have been neglected because of the lack of necessary evaluation and monitoring. It is estimated that approximately 10% of the rural population have access to reliable, safe and adequate water supplies. The reasons for this low figure have been assessed as: lack of community participation; inadequate design, supervision and construction; and a lack of suitable manpower with necessary training and skills.

Almost all 19 provinces are funded by NPEP and the Asian Development Bank and the average funding level is too low to achieve lasting improvement to existing conditions.

To achieve the Decade targets, provincial surveys have been conducted, provincial programmes have been drawn up, health and education programmes have been started and the development, introduction and dissemination of information on simple and reliable technology has been supported.

One aim of the National Policy on Water Supply and Sanitation is to increase self-reliance, awareness and responsibilities of communities and private owners in the operation and maintenance of water and sanitation facilities.

What is generally found to be lacking in the provinces is enough up-to-date information on which to base an accurate and comprehensive Provincial plan for a rural water supply and sanitation programme.

The government are working to design a survey to gather such information to formulate these plans. Central government is also without a proper monitoring and evaluation system.

So far, three provinces have completed the survey and have drawn up Provincial Plans comprising goals and targets. Surveys have been completed along the Irian Jaya/Papua New Guinea border.

Communities are now being encouraged to organise a water committee with a number of their members to be trained in basic maintenance. This is part of the programme, which also intends to identify manpower training needs for each province.

From an institutional viewpoint, the creation of provincial and/or district level construction and maintenance is being encouraged. At central government, efforts are being made to provide necessary back up and support services to the provinces as prescribed in the policy statement.

Great emphasis is placed on health education and the National Health Department is developing health education materials, and will be conducting courses in health education for health personnel in contact with village people.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
372	179	26.5	156	200	2,635	264	75
(1985 Actual)					(1985)		
435	348	65	87	344	2,908	436	1,018
(1990 Targets)					(1990)		
		N/A				N/A	

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
200	70	1,000	20-500	15.00	10.00

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.55	0.55	Yes

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	80
Investment totals (US $ millions 81-85)	34

Paraguay

Currency: Guarani 240 = US$1.00 (official rate)
Population: 3.681 million
Official languages: Spanish/ Guarani
Population growth rate: 3%
GNP per capita: $1,526
Life expectancy: 65.1 years
Infant mortality per 1,000 births: 30
Water diseases per 100,000: 1,146
Adult literacy (M/F): 91/85

UNDP resident representative: Edificio Citibank, Calle Estrella 345, Casilla de Correo 1107, Asunción.

WATER AND SANITATION AGENCIES

Corporacion Nacional de Obras Sanitarias (CORPOSANA), Jose Berges y Brazil, Piso 2, Asunción

Ministerio de Obras Publicas y Communicaciones, Alberdi esq. *General Diaz*, Asunción.

Servicio Nacional de Saneamiento Ambiento (SENASA), Marisacal Estigarribia Esq. Tacuari, Asunción.

The rivers of Paraguay provide the bulk of the country's urban water supply, with the flows of the Paraná and the Paraguay the most important. The eastern region between the Paraguay and the Paraná has the highest rainfall, in areas up to 1,750mm, but falling to 750mm in the Chaco region in the west.

Groundwater is available at depth and is the source of most of the supply for small towns and villages away from the big rivers. Boreholes go down to aquifers from 120m to 180m.

It is the arid Chaco region that provides the greatest problem for water supply, with the widely dispersed population using boreholes where possible, though progress has also been made in the collecting of rainwater from roof catchments.

A plan for the Drinking Water Supply & Sanitation Decade was formulated in 1983. By 1985, 63.7% of the urban population was targetted to have water supply house connections, a figure to increase to 67% by 1990. There are 2% of the urban population to be served by standpipe by 1990.

In rural areas, the 1990 target is for a modest 12% of people to be served - most likely from boreholes.

In the sanitation sector, 34% of the urban population are scheduled to have domestic sewer connections by 1990. There are 62% to be served by "other means" - pit latrines and other alternatives.

Paraguay has a high population growth rate of 3%, and consequently the percentage of population served in rural areas may in fact have gone backwards.

At the start of the Decade, 89% of the rural population had latrine facilities, whereas the target established for 1990 was service for 76%.

Unit cost per capita at the start of the Decade for urban water house connections was $125; for urban house connected sewerage, $140; rural water supply $130; rural sanitation $30; alternative urban sanitation systems $180.

The Corporacion Nacional de Obras Sanitarias (CORPOSANA) functions in urban areas in planning, design, construction, management and maintenance and loan negotiation. In rural areas, an analogous function is performed by Servicio Nacional de Saneamiento Ambiento (SENASA).

Major constraints are the lack of an adequate inventory of water resources, and a paucity of trained personnel. At the start of the Decade, of 1,560 people working at various levels in the relevant sectors, only 52 had received any formal training.

Some efforts have been made to improve this situation, but there remains a very long way to go.

Peru

Currency: Inti 15.2 = US $1
Population: 18,600,000
Official language: Spanish
Population growth rate: 2.6%
GNP per capita: $1,010
Life expectancy: 59 years
Infant mortality per 1,000 births: 133
Water diseases per 100,000: 900
Adult literacy (M/F): 91/78
UNDP resident representative: Apartado 4480, Naciones Unidas, Lima

WATER AND SANITATION AGENCIES

Servicio Nacional de Abastecimiento de Agua Potable y Alcantarillado - SENAPA- Domingo Cueto 129, Lima 11
Telephone: 71-4920

Servicio de Agua Potable y Alcantarillado de Lima - SEDAPAL Monterrey 281, Chacarilla del Estanque, Lima 33
Telephone: 36-5166

Direccion General de Aguas, Suelos e Irrigaciones Ministerio de Agricultura, Avenida Salaverry s/n, Lima 11
Telephone: 31-2565

The Republic of Peru on the west coast of South America, has a surface area of 1,285,216km^2 and may be divided geographically into three distinct regions: the Pacific coastal plain, covering 11.2% of the land area but accomodating almost 50% of the population; the north-south Andes mountain range, home for 39% of the population; and the rain forest to the east of the Andes where annual precipitation reaches 2,000mm with temperatures above 30°C.

The Andes divides the country into two watersheds: the vast Amazon basin to the east and some 50 seasonal water courses. It is believed that the Pacific plain has substantial groundwater resources, but an adequate study has not been undertaken.

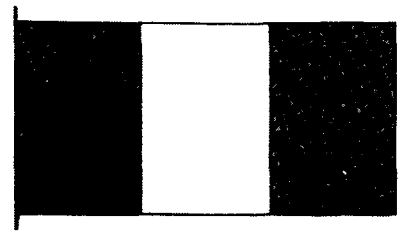
Of almost 19 million people, over 12 million live in urban areas; 42% of the population is concentrated in the capital, Lima. Over 6 million people live in rural areas.

The economy depends on construction and manufactured products; the Instituto Nacional de Planificacion, the national planning institute, has prepared a national development plan which seeks to stimulate the economy, reduce inflation and lower unemployment.

In 1985, 61% of the urban population had drinking water supplies by house connection and 12% by standpost. Over 1 million people, or 17% of the rural population had drinking water supplies.

In sanitation terms, over 6.2 million of the urban population, that is 49%, had sewer connections and 18% had access to sanitation facilities by other means. In the rural communities, 12% of the population were provided with sanitation services.

The government's Decade targets include providing 63% of the urban



population with water supply by house connection and 20% by standpost. Sewer connections should be provided to 59% of the urban population, with 22% having adequate sanitation by other means.

In the rural areas, 54% should have water supplies and 53% access to sanitation.

Total investment required to achieve the Decade targets is estimated at $1,337M, 76% of which would be applied to new projects and almost 10% for rehabilitation works.

The National Drinking Water and Sewerage Service, SENAPA, was created in 1981 under the direction of the Ministry of Works, Housing and Construction, and employs more than 90% of the sector's human resources, distributed throughout the country. The Ministry of Health (DIGEMA), is in charge of water supplies and sanitation in rural areas with communities of less than 2,000 inhabitants. CONCOSAB, the Comite Nacional de Saneamiento Basico is responsible for coordinating and implementing the Decade Plan.

Major development constraints include a lack of finance, lack of information on water resources, lack of community participation and an insufficient number of trained personnel.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
10,925	6,227	1,180	6,000	242	5,887	1,210	24
(1985 Actual)					(1985)		
12,546	7,618	1,530	6,203	2,705	7,152	1,196	891
(1990 Targets)					(1990)		
14,865	9,345	2,994	8,724	3,341	7,467	4,056	3,962

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
72	20	74	20	29	27

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
170	40	250	50

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.12	N/A	Some Areas

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	774
Investment totals (US $ millions 81-85)	118.6

Philippines

Currency: Peso 25.50 = US$1.00
Population: 55,336,000 (40% urban)
Official language: Pilipino/-English
Population growth rate: 2.47%
GNP per capita: US$585
Life expectancy: 63 years
Infant mortality per 1,000 births: 56.60
Water diseases per 100,000: 785.38
Adult literacy (M/F): 86/85

UNDP resident representative: 106 Amorsolo Street, Lagaspi Village Makati PO Box 1864, Manila, 2801

WATER AND SANITATION AGENCIES:

Ministry of Public Works and Highways, Second Street, Port Area, Manila.

Metropolitan Water Works and Sewerage System, Katipunan Road, Diliman, Quezon City.

Department of Health, San Lazaro Hospital Compound, Sta. Cruz, Manila.

Office of Human Settlements; c/o Office of the President, Malacang, Manila.

Department of Foreign Affairs, PICC Complex, Roxas Boulevard, Manila.

The Republic of the Philippines is grouped into three major islands, Luzon (the largest), Visayan and Mindanao, and covers 300,152km^2. It has a population of 55.34 million. There are 13 regions which consist of 75 provinces and within the provinces are 1,535 municipalities and 60 cities of 42,000 *barangays*.

The urban areas have good communication facilities, but in the rural areas communication networks are scarce.

Before the Water Decade, there were six water supply construction agencies and each agency did its own construction work which resulted in poor coordination and overlapping functions. The Integrated Water Supply Programme was formed by the government to alleviate this problem and to define the responsibilities and jurisdictions of each agency: National Water Resource Council - a multi-agency body which coordinates and regulates all activities related to the development, management control, conservation and proper use of water resources; Metropolitan Waterworks and Sewerage System; Local Water Utility Administration; Rural Waterworks Development Corporation; Ministry of Public Works and Highways; Ministry of Local Government; Ministry of Health.

Decade plans

The Water Decade has been considered as a special project by the government and, to ensure success, all the different agencies created a Project Management Office. A Project Implementation and Review Committee was created to achieve effective implementation and the PIRC reviews the progress of the whole Water Decade programme, evaluating implementation, recommending solutions to constraints and redirecting the implementation whenever necessary.

Water supply

The number of water supply facilities constructed by different agencies in 1985 were: 6,972 (level 1); 193 (level 2); and 54 (level 3).

Priorities in selecting water supply systems for rural areas are based on: community commitment and capacity; community needs; community development level and potentials; and capital cost.

Groundwater from springs and wells which requires little or no treatment to make it safe is preferred to surface water when selecting appropriate water supply projects in rural areas. Shallow wells wherever possible are much preferred to expensive deep wells.

Intensification of a toilet construction campaign is being pursued through a community participation in the same way as water quality control in all public water sources is being stressed through the Primary Health Care Approach. **continued on page 148**

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
17,392	9,303	2,012	206	13,955	30,522	13,034	20,486
(1985 Actual)					(1985)		
22,243	7,851	3,094	789	17,676	33,093	17,705	18,519
(1990 Targets)					(1990)		
26,716	17,000	3,737	1,024	22,174	35,458	26,000	21,275

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
33.90	1.05	31.07	41.00	21.93	11.60

Philippines (cont)

The programming of Decade implementation activities starts from the community, based on the necessary data and information and is then passed on to the Municipal, Provincial, Regional and up to the National PMOs. Whereas policy, guidelines, technical assistance and logistic support is provided from the national level down to the *barangay* level.

Of the factors influencing the success of the decade aims, community participation, intensified health education, government support in funding projects, international and bilateral financial support and WHO technical assistance are seen to be amongst the most influential features of the Decade fulfilment to date.

WATER CONSU[illegible]TION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
194	60	155	50

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.05	0.15	Yes

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	1,943
Investment totals (US $ millions 81-85)	566

Poland

Currency: Zloty 239.10 = US $1.00
Population: 37,114,000 (60.2% urban)
Official language: Polish
Population growth rate: 0.90%
GNP per capita: US $2,050
Life expectancy: 75 years
Infant mortality per 1,000 births: 18.30
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

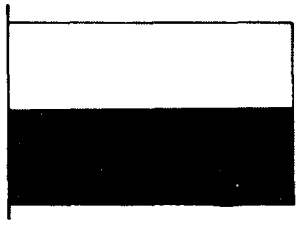
Centralny Urzad Ochrony Srodowiska i Gospodarki Morskiej (Central Office for Environmental Protection & Water Economy) ul Fltrowa 57, 02-056 Warsaw, Poland
Telephone: +48 (22) 25 44 81
Telex: 813285

Ministerstwo Zdrowia i Opieki Spolecznej (Ministry of Health & Social Welfare) ul Miodowa 15, 00-246 Warsaw, Poland
Telephone: +48 (22) 31 34 41
Telex: 813864 MZIOS PL

The ratio of Poland's urban population to the total has climbed 1.5% between 1980 and 1985 to 60.2% and indications are that this will increase at the end of the decade to 64%.

Just over 88% of this urban population are served with a water supply via house connections while the remainder have access to public standposts. In rural areas the population with reasonable access to safe water is only 73%, but this is a 5% increase on the situation at the start of the 1980s.

A high percentage of the urban population, almost 80%, are served by connection to public sewers, while the remainder are served by household systems such as pit privies, septic tanks or communal toilets. In rural areas, however, only about 42% of the people have adequate excreta disposal facilities.



Some 12% of rural villages with ongoing water or sanitation programmes actually participate actively in the planning of such schemes, while two-thirds of them also participate in the construction and 6% remain involved in operation and maintenance.

In these areas, policies are being implemented specifically intended to increase the participation of women in these activities through rural women's organisations and rural cooperatives. Some projects are being conceived and integrated with other primary health care components, but not in all areas.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
230	~200	214	~140

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
20,790	17,775	3,015	15,925	4,865	14,788	~10,056	~5,619
(1985 Actual)					(1985)		
22,333	19,698	2,635	17,755	4,578	14,781	~10,790	~6,208
(1990 Targets)					(1990)		
26,500	N/A	N/A	N/A	N/A	14,500	N/A	N/A

Portugal

Currency: Escudo 141.7 = US$1.00
Population: 9,316,000 (46% urban)
Official language: Portuguese
Population growth rate: 0.13%
GNP per capita: US$ 2,097
Life expectancy: 80 years
Infant mortality per 1,000 births: 16.73
Water diseases per 100,000: 12.98
Adult literacy (M/F): 89/80

WATER AND SANITATION AGENCIES

Secretaria de Estado do Ambiente, Rua do Seculo 51, 1200 Lisbon, Portugal.
Telephone: +351 (1) 32 38 12

Direcção Geral dos Recursos Hidraulicos, Av Alma Gago Coutinho 30, 1000 Lisbon, Portugal.
Telephone: +351 (1) 80 78 01

Ministerio das Obras Publicas, Praça do Comercio, 1100 Lisbon, Portugal.
Telephone: +351 (1) 87 95 41

Direcção Geral do Saneamento Basico, Lisbon, Portugal.

Ministerio do Plano e Administação do Território, Praça do Comercio, 1100 Lisbon, Portugal.

Telephone: +351 (1) 37 17 11

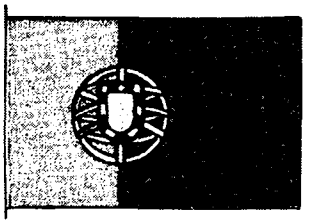
At the start of the International Drinking Water Supply & Sanitation Decade, all of Portugal's urban residents had some form of water supply and about 90% had house connections. However, in rural areas, the percentage population with a safe water supply was only 12%.

But even this pitifully low rural figure was double that of 1978 and this rate of improvement has been kept up with a figure of 22% of rural people having reasonable access to safe water in December 1985. The target for the end of the Decade has been set at 80%.

If this figure is going to be difficult to achieve, the 80% target for rural sanitation by the end of 1990 looks twice as difficult. In December 1980, only 5% of the rural population had access to adequate excreta disposal facilities such as pit privies, septic tanks, or communal toilets. By the end of 1985, this had only reached 11%.

In urban areas, the proportion served by connection to public sewers had increased from 60% to 70% between 1980 and 1985. The remainder of the population has access to other adequate means of excreta disposal. The 1990 target is 100% connection to sewerage systems for urban areas.

Most water supply and sanitation functions in Portugal are the responsibility of the municipalities concerned. However, overall planning is the brief of the Direcção-Geral do Saneamento Básico assisted by Regional Coordinating Commissions. This directorate



also takes responsibility for local planning design and control and supervises construction in urban areas. It is joined in responsibility for water quality control by the Direcção-Geral de Saúde, which is also charged with inspection of rural sanitation.

Construction, operation and maintenance are all under control of the municipalities for water supply and sanitation, both urban and rural.

The country has no water supply and sanitation service date collection and information system, and water quality is only regularly surveyed in urban areas.

Progressive water tariffs do exist in some areas but tariffs generally in Portugal are very irregular. No up-to-date figures are available for unit construction costs per person served, but in 1980, these were US$0.135 for urban house connections, $0.09 for public standposts and $0.22 for rural supplies. Urban sewerage cost $0.24/person not including house connections, while alternative urban sanitation systems averaged $0.106 per person.

The average cost of water production in 1980 was $0.16/m^3.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
3,913	3,522	391	2,348	1,565	5,329	640	266
(1985 Actual)					(1985)		
4,328	4,328	—	3,030	1,298	4,987	1,097	549
(1990 Targets)					(1990)		
4,467	4,467	—	4,467	—	5,186	4,150	4,150

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	99.3
Investment totals (US $ millions 81-85)	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
160	80	92	23

Rwanda

Currency: Rwanda Franc 81 = US$1
Population: 6.33 Million (4% urban)
Official language: Kinyarwanda, French
Population growth rate: 3.7%
GNP per capita: US$280
Life expectancy: 49 years
Infant mortality per 1,000 births: 115
Water diseases per 100,000: 2,872
Adult literacy (M/F): 61/33

UNDP resident representative:
Avenue de l'Armée 12 BP 445, Kigali

WATER AND SANITATION AGENCIES

National Committee on Water and Sanitation
Electrogaz

Covering 26,338km^2 of mountainous terrain, Rwanda is a least-developed landlocked country. The country is bordered by Uganda to the north, Zaire to the west, Burundi to the south and Tanzania to the east. Rwanda has two rainy seasons with an average annual rainfall of 800mm in the east and 1,600mm in the north, though rainfall levels reach 2,000mm in some areas. The country has substanial groundwater resources which have yet to be fully defined.

Total population in 1985 was 6,331,000 growing at a rate of 3.7% per year, one of the highest growth rates in the region. The population is predominantly rural (96% or 6,078,000 people) and agriculturally-based.

The total population without safe water in 1985 was estimated to be 51% while 44% were without adequate sanitation.

Water supply

In 1985 79% of the urban population was provided with clean water, 47% or 120,000 people by house connections and 32% or 80,000 people by public standpipe. This represents a considerable improvement over the 1980 figure of 48%.

Targets for coverage in 1990 were for 90% of the urban population (370,000 people) to be supplied with clean water, half by house connection and half by public standpipe. This requires house connections for an additional 65,000 and provision of standpipe facilities for an additional 105,000 people.

In the rural areas 48% of the rural population, or 2,888,000 people, were supplied with adequate water. Plans are for this to be extended to 4,797,000 people - 70% of rural dwellers - by 1990 but the government has been failing to keep up with growing population in rural areas. In 1980 55% of the rural population was supplied with clean water.

Sanitation

The number of urban dwellers provided with adequate sanitation in 1985 was 195,000 or 77% compared with 60% in 1980. There were no sewer connections and the government has no plans for mains sewerage. The Decade plan envisages sanitation coverage for 85% of the population by 1990, or 349,000 people.

The number of rural dwellers with access to adequate sanitation in 1985 was 3,367,000 or 55% of the population, an increase over the 1980 figure of 2,500,000 which represented 50% of the population. Objectives for rural sanitation are for 75% coverage or 5,139,000 people by 1990.

Decade plan

A Decade plan was drawn up in 1984 by the National Committee on Water and Sanitation which was established at the beginning of the Decade. This included representatives from several ministries, district councils, and the state agency Electrogaz. There is no established training budget as yet.

Per capita unit costs of house connections averaged US$165 in 1985 while the cost of provision by standpipes averaged US$55. The average per capita cost or provision of non-sewerage urban sanitation is reported as US$385 - very high for the region, in fact higher than the cost of sewer connections in most countries.

The cost of rural water supply averages US$22.50 per person and provision of rural sanitation averages US$18-25 per person.

Studies for a tariff scheme were included in a World Bank financed project which included specialist technical and managerial training Health education is a feature of most school curricula.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
233	70	42	—	140	4,952	2,700	2,500
(1985 Actual)					(1985)		
253	120	80	—	195	6,078	2,888	3,367
(1990 Targets)					(1990)		
411	185	185	—	349	6,852	4,797	5,139

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
165	55	N/A	385	22.5	18-25

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
60	10	15	8

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.40	0.43	YES

St Kitts-Nevis

Currency: East Caribbean Dollar 2.7 = US$1.00
Population: 43,000*
Official language: English
Population growth rate: N/A
GNP per capita: US$1,550*
Life expectancy: 64 years*
Infant mortality per 1,000 births: 41**
Water diseases per 100,000: N/A
Adult literacy: N/A

*World Bank, 1985
**UNICEF, 1986

WATER AND SANITATION AGENCIES

Water Department, Ministry of Communications, Works & Public Utilities, Wellington Road, Basseterre, St Kitts.

Public Health Inspectorate, Health Department, Basseterre, St Kitts.

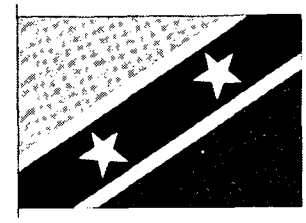
The two islands St Kitts and Nevis are part of the Leeward group in the West Indies, and cover together 269km^3. In 1979, the population was estimated at 50,000, with 16,000 people in the St Kitts capital Basseterre and 1,500 people in the only town on Nevis, Charlestown. However, the World Bank's *World Development Report 1987* puts the 1985 population at 43,000.

The economy has been tied to the sugar industry, and consequently the fluctuations in the commodity markets. The government has been attempting to diversify into light manufacturing, cash crops, and tourism.

Levels of service

All of Basseterre had a water supply in 1979, 57% by house connections, and the rest by standpipes. However, serious water deficits were reported in rural areas on St Kitts in 1983. Mountain stream sources had been fully exploited, and the Canadian International Development Agency was carrying out exploratory drilling for groundwater. About one third of domestic supplies then came from groundwater, especially in the dry season.

On Nevis the situation was worse in 1983, with chronic water shortages for most of the year. Nevis Council operated four existing public supply systems, with support from the Water Department for difficult problems and capital works. An additional storage reservoir was planned, as well as improvements to the transmission and distribution mains. The long-term solution was seen as the development of groundwater.



Neither St Kitts or Nevis had a sewerage system in 1979, although the government was considering applying for external assistance to provide Basseterre with sewers. The capital was at that time served half by septic tanks and half by pit latrines. Rural sanitation was non-existent in some areas, largely because the rocky volcanic subsoil makes construction difficult. The Health Department's efforts to improve rural sanitation by subsidising materials had mostly failed.

Investment needed

In 1978 the estimated cost of reaching the government's targets - adequate water supply and at least rudimentary sanitation for all - was only $3.5M. CIDA was willing to undertake the 60% foreign component, but negotiations with the Caribbean Development Bank over the local costs had stalled because revenue from water tariffs went to the general government, not the Water Department.

In 1985, the European Development Fund granted $700,000 for a water development project on Nevis, to supply Charlestown and the southern half of the island.

Report based on a sector digest dated March 1979 and information from the Commission of the European Communities.

St Lucia

Currency: East Caribbean Dollar 2.7 = US$1.00
Population: 136,000 (52% urban)
Official language: English
Population growth rate: N/A
GNP per capita: US$1,240*
Life expectancy: 73 years (1984)*
Infant mortality per 1,000 births: 18*
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Water & Sewerage Authority, L'Anse Road, Castries

Covering 616km^2, St Lucia is part of the Windward group of the West Indies. The island is volcanic, forested and fertile. Principal exports are tropical agricultural produce, especially bananas.

The most significant event since the start of the Decade has been the formation of the Water & Sewerage Authority in 1985. This has taken over most of the responsibilities of the old Central Water Authority and the Environmental Health Division of the Ministry of Health.

Following the formation of WASA, a revised tariff structure was introduced island-wide in 1985/6, which transferred responsibility for the payment of water charges in the rural areas beyond Castries and Vieux Fort to the consumer, thus ending a government subsidy. The bulk of these rural supplies are unmetered and the charge is calculated according to the number of permanent occupants and fixed per-capita consumption.

All commercial consumers are metered and separate tariffs are levied for commercial, hotel and domestic supplies, with unmetered domestic supplies linked to, but lower than, the metered domestic rate. The WASA now places great emphasis on the reduction of waste, through use of modern technology in data management and leak detection.

The improvement of water production and transmission systems in the south of the island is funded on optimising the potential for low-energy-use solutions. The Roseau project, now at the design stage in the north of the island, includes river impounding works and construction of new treatment works near Castries to be fed by raw water transmission lines from the Roseau valley.

With the help of Wessex Water of the UK, the WASA has already produced a capital programme for essential sewerage works for the decade 1986–1996.

Majority of information provided by Wessex Water, UK.

St Vincent & Grenadines

Currency: East Caribbean Dollar 2.7 = US$1.00
Population: 119,000*
Official language: English
Population growth rate: N/A
GNP per capita: US$850*
Life expectancy: 69 years*
Infant mortality per 1,000 births: 33**
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

*World Bank, 1985
**UNICEF, 1986

WATER AND SANITATION AGENCIES

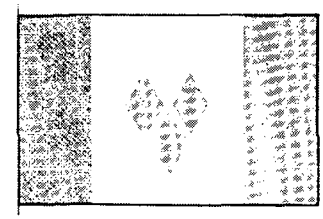
Central Water & Sewerage Authority, Ministry of Health, PO Box 363, Kingstown, St Vincent

More than 90% of the St Vincent and the Grenadines' population live on the capital island, and the remainder on the five populated islands of the Grenadines.

In 1980, it was estimated that 90% of the inhabitants of mainland St Vincent had access to safe water, 39% from house connections and 51% from standpipes. Springs and rivers are tapped at high elevation and fed by gravity, after sedimentation and chlorination, to storage tanks, or directly into supply via break-pressure valves. In 1980, the system produced 27,300m^3/d. Groundwater resources, believed to exist, had not been explored in 1980.

Grenadines, however, relied mainly on individual rainwater catchment systems. There were three public catchments on storage on two islands, Bequia and Union. Some brackish water wells were used for sanitary purposes, but no evaluation of groundwater potential had been made. In the dry season of 1979, 2,000m^3 of fresh water had to be barged to the islands at a cost of $46,000.

In the 1970s, the first two phases of a three-phase Canadian-funded project to improve water supply were completed, providing an additional 10,500m^3/d to Kingstown suburbs and the North Leeward areas. In 1983, the government was still trying to find external finance for phase III, the Cane Garden and Sion Hill distribution improvements and Kingstown ring main connection, due then to be started in 1986, at a cost of $330,000.



Two other projects, rural water supply in South Rivers, Dalaway, Golden Vale, and North Leeward, and improvement of Grenadines water supply were also waiting for offshore grants or loans in 1983. Estimated costs were $900,000 and $2.3M respectively.

However, the most serious problem facing the country is lack of sanitation. In 1980, it was reported that more than 2,500 households were without sanitary facilities of any kind. Two sewerage systems in Kingstown and Arnos Vale served just 4% of the population and discharged raw sewage to the sea, causing severe coastal pollution. At the end of 1983, the CWSA was looking for finance to add treatment facilities to these systems, at a cost of $836,000.

The Ministry of Health established a revolving fund in 1980 to produce and sell at cost pre-cast concrete units for pit latrines. By 1983, only 200 units had been made with a subsidy of $7.4 per unit, and the revolving fund needed replenishment.

Sao Tome & Principe

Currency: Dobra 35.4 = US$1.00
Population: 1.08M (33% urban)
Official language: French
Population growth rate: 2.3%
GNP per capita: US$362
Life expectancy: 64 years
Infant mortality per 1,000 births: 62

Water diseases per 100,000: 6,000
Adult literacy (M/F): 73/42

UNDP resident respresentative: Avenida dos Nacoes Unidas, CP 109 São Tomé.

WATER AND SANITATION AGENCIES

Ministère de l'Equipment Social & de l'Environnement, São Tomé.

Ministry of Health, São Tomé

Water & Electricity Directorate (DAE), São Tomé

Central Organisation for Public Works (TP), São Tomé

About 88% of the urban population of São Tomé & Principe has a piped water supply, either from house connections or standpipes.

In 1978, there were 2,183 private connections in the capital, Saõ Tomé, and 144 standpipes. Santo-Antonio, on Principe island, had 80 house connections and seven standpipes. These together serve 98% of the 1978 population, which suggests (if the estimates are accurate) that the systems have not expanded to keep pace with population growth.

In rural areas, where two-thirds of people live, 46% have a safe water supply from public standpipes, compared with 79% who were thought to be served in 1978. The discrepancy may be due to inaccurate reporting in 1978, when no study had been made of the newly-independent country's resources and needs.

São Tomé has a sewerage network, which serves 8% of the town, but most houses are built outside the service area, and rely on septic tanks. In 1985, it was estimated that some 17% of the towns' population had access to a sanitary disposal facility, often badly maintained and unhygienic, particularly in the rainy season.

Some progress has been made in rural sanitation, where 15% of the population now have latrines. In 1978 there were no sanitary installations in rural areas, and UNICÉF was giving the Ministry of Health some help in establishing a rural sanitation programme.

National plans

In 1980 there was no structure plan for the management and development of the water sector, other pressing economic issues taking precedence so soon after independence. The 1985 sector plan envisages 89% of the urban population will be served with a piped supply by 1990, and 76% will have improved sanitation, mostly by connections to sewers. In rural areas, 74% should have safe water and 92% adequate sanitation.

There is no information on how this will be achieved, institutionally or financially.

There is still no formal training budget in 1985, but a total of 85 staff now work in the sector, 70 of them at the artisan level. There are seven engineers with a technical qualification.

It is estimated that $11.4M is needed to meet the decade target.

ACTUAL AND TARGET LEVELS OF COVERAGE

	Urban population served (000's)					Rural population served (000's)		
	Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)		N/A	N/A	N/A	N/A	(1980)	N/A	N/A
(1985 Actual)	36	10	22	3	3	(1985) 72	33	11
(1990 Targets)	47	18	24	29	7	(1990) 72	53	66

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
63	31	150	120	40	20

WATER CONSUMPTION l/c/d

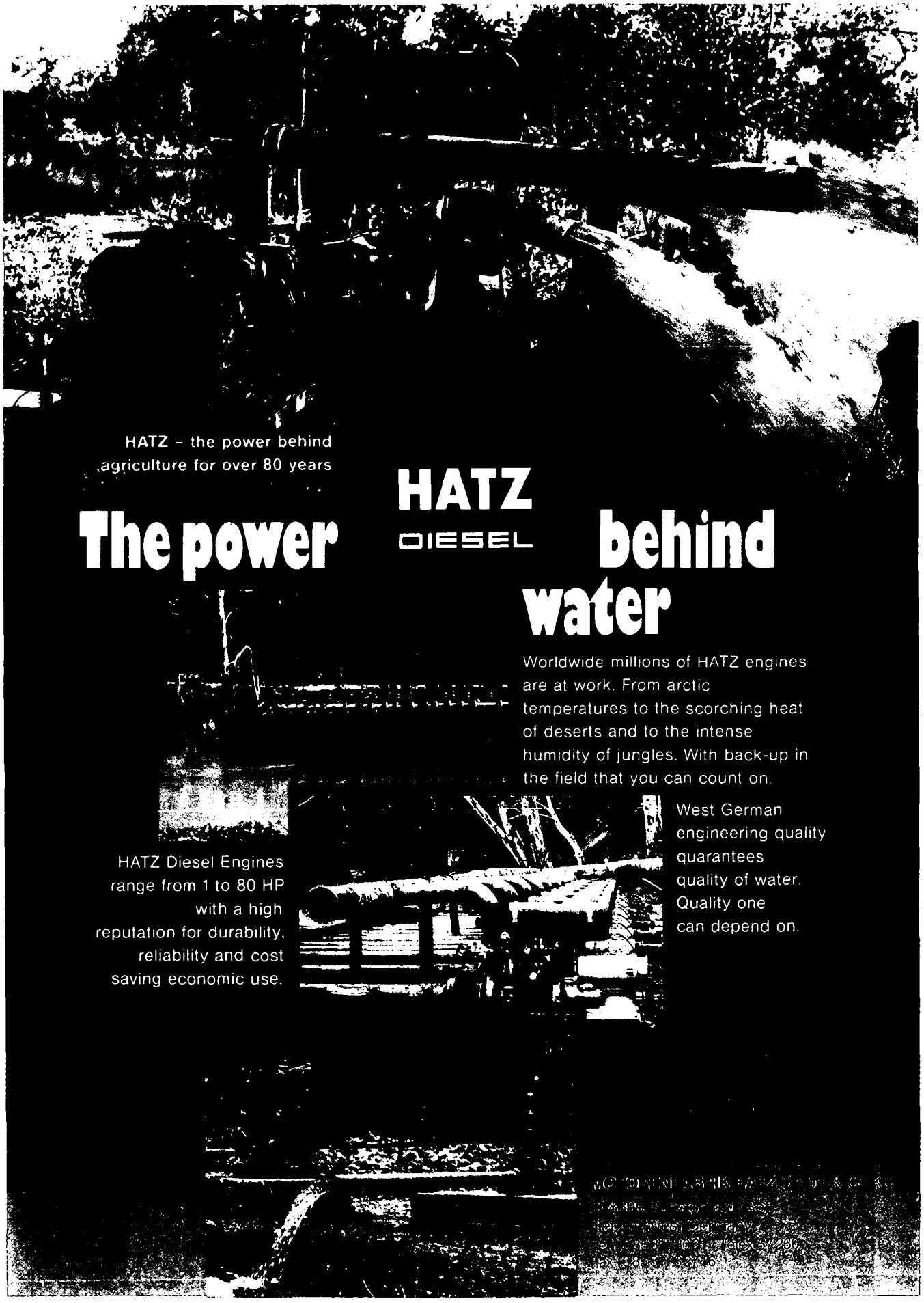
For design		Actual	
Urban	Rural	Urban	Rural
60	30	170	20

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.05	NO

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	11.4
Investment totals (US $ millions 81-85)	N/A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Saudi Arabia

Currency: Saudi Riyal 3.75 = US$1.00
Population: 11.5 million (80% urban)
Official language: Arabic
Population growth rate: 3.2%
GNP per capita: US$8,850
Life expectancy: 62 years
Infant mortality per 1,000 births: 78
Adult literacy (M/F): 35/12

UNDP Resident Representative: King Faisal Street, (Olaya Street), PO Box 558, Riyadh, Saudi Arabia

WATER AND SANITATION AGENCIES

Ministry of Agriculture & Water, Airport Road, Riyadh, Saudi Arabia
Telephone: +966 (1) 4011699
Telex: 201692 AGRIRS SJ

Ministry of Municipal & Rural Affairs, Nasirya Street, Riyadh, Saudi Arabia
Telephone: +966 (1) 4415434
Telex: 201063 DOMA SJ

Saline Water Conversion Corporation, PO Box 5968, Makkah Road, Riyadh 11432, Saudi Arabia
Telephone: +966 (1) 4630503
Telex: 200097 TAHLEA SJ

Water & Sewerage Department, Central Province, PO Box 1562, Riyadh 11441, Saudi Arabia
Telephone: +966 (1) 4354554
Telex: 200360 MIAH SJ

Groundwater and seawater are the principal sources of water supply for Saudi Arabia - one of the world's driest countries. Evapotranspiration rates in the hot desert climate are high almost everywhere and most floodwater is lost through evaporation during the summer when shade temperatures can exceed 49°C.

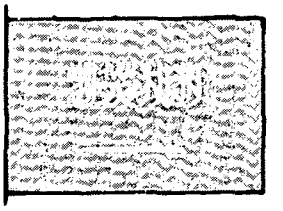
The Kingdom extends over most of the Arabian peninsula and has a land area of 2,253,000km^2. It has a relatively small population of only 8.7 million (1985): about 27% of which is nomadic. Rapid industrial development over the past 15 years has been accompanied by increasing urbanisation and more than 42% of the total population now lives in cities of more than 100,000 people.

Saudi Arabia is the world's largest producer of desalinated potable water. Desalination plants have been installed at many cities on the Red Sea and Arabian Gulf coasts and the capital cost of desalination work (excluding reticulation networks) totalled 25,000M Saudi Riyal in December 1985.

The largest desalination plant in the world is located at Al-Jubail on the Arabian Gulf and 623,000m^3/d of desalted water is conveyed 466km through twin 1.5m diameter steel pipelines to Riyadh where it is blended with groundwater to provide essential minerals before distribution.

The technology used in the Saudi desalination plants is principally multistage flash distillation, but reverse osmosis is considered viable for projects of less than 3,785m^3/d.

Rainwater is being stored behind check dams and diverted into wadis from which it is able to percolate into the main aquifers. Treated wastewater



is also being used to recharge aquifers in a few places.

Development plan

In the Fourth Five Year Development Plan (1985-1989), the quality and quantity of drinking water in rural areas will be improved and a percentage of the rural population will be served with a public water supply. This national plan meets the objectives of the Water Decade.

Conventional sewerage is available in large cities, while septic tanks are used in rural areas. Conventional sewerage is regarded as an expensive rural solution for holy places where pilgrims spend only a few days or hours each year.

Saudi Arabia's wastewater authorities use effluent for irrigation in certain suitable sites. During the current Five Year Plan, several cities will be carrying out studies for the reuse of treated effluent. National wastewater regulations are being prepared by the Ministries of Health, Agriculture & Water, Municipal & Rural Affairs, and Industry & Electricity and by the water and sewerage authorities.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
300	N/A	800	150	N/A	N/A

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
6,358	2,225	3,607	1,231	3,900	1,150	1,000	575
(1985 Actual)					(1985)		
7,029	6,000	1,000	5,000	2,029	1,757	1,200	575
(1990 Targets)					(1990)		
9,346	7,772	1,574	6,519	2,278	940	940	575

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
350	250	250	110

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
1	0.1	NO

Senegal

Currency: CFA Franc 307 = US$1
Population: 6,500,000 (40% urban)
Official language: French
Population growth rate: 2.8% (1980)
GNP per capita: $380 (1984)
Life expectancy: 44 years
Infant mortality per 1,000 births: 137
Water diseases per 100,000: 360 (1980)
Adult literacy (M/F): 37/19

UNDP resident representative: 2 avenue Roume, BP154 Dakar.

WATER AND SANITATION AGENCIES

Ministère du Plan et de la Coopération,
Dakar
Telex: 3133 PLANCOOP

Direction de l'Hydraulique Urbaine et Rurale, Ministère de Développement Rurale,
BP 4021 Dakar.
Telex: 3151 COORCILE

Société d'Exploitation des Eaux du Sénégal (SONEES),
Immeuble Kebe, 97 rue Andre Peytavin, BP 400, Dakar.
Telephone: 215091
Telex: 3137 SONEES

Société Nationale des Forages,
Dakar.
Telex: 268 SONAFOR

Situated at the western extremity of continental Africa, Senegal occupies 196,722km^2 of flat land, with altitudes rarely exceeding 100m.

Rainfall varies from 200mm to 1,600mm, falling mainly in one wet season from June to October. The country suffers from the climate uncertainty which afflicts the Sahelian region, and periodic droughts can prevent adequate groundwater recharge, and lower the resources of the Senegal and Gambia rivers.

In an average year, about 150,000M.m^3 of water falls as rain, but little is controlled or impounded. The full extent of groundwater reserves is unknown.

The 6th Plan, covering the period 1981-1985 had a total investment budget of nearly $2,000M, and $23M was spent in the water sector, $20M of which came from external sources. This represents only 2.2% of the estimated $1,027M needed to meet decade targets.

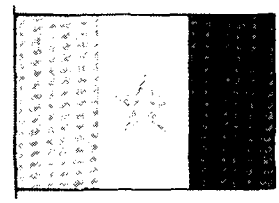
Decade plans

In 1980, 77% of urban dwellers had a safe water supply, a third with house connections. In rural areas, 25% had access to standpipes, fed from boreholes and wells.

Although sewers only served 5% of the urban population, some form of latrine or tank was available for the rest. In rural areas, only 2% had acceptable sanitation systems.

A special "urgent rural hydraulics plan" was added to the 6th Plan in 1981, providing for the installation within two years of equipped boreholes in 316 communities at a cost of $42M. It included a maintenance programme and sanitation education. Urban studies were also made for water supply at new and existing interior centres and sanitation in regional capitals.

Although the urban population grew by 4.4% between 1980 and 1985, water supply kept pace, and 79% of townspeople have an acceptable supply. By 1990 the figure should be 93%. Satisfactory sanitation is available for 87%.



In rural areas, the provision of clean water has improved to serve 38% of villagers, with plans to supply two-thirds by the end of the decade. There are no data on proposals for rural sanitation.

Responsible agencies

A new Ministère de l'Hydraulique assumed responsibility for water supply and sanitation in 1981. It oversees the activities of the Société Nationale d'Exploitation des Eaux du Sénégal (SONEES) and the Société Nationale des Forages (SONAFOR). SONEES operates and maintains existing water supply, distribution and sanitation facilities, while SONAFOR conducts most of the national drilling programme.

Three ministries (Santé, Urbanisme, Environnement) participate in sanitation programmes. Financial investment in the water sector is undertaken by the Ministères des Finances et Affaires Economiques, du Plan et de la Coopération.

Investment needs

The personnel available to the ministries was considered adequate in 1980. No figures are available on current staffing levels.

In 1980, the average water tariff ($0.46/m^3) covered the average cost ($0.40/m^3) of water production.

The main constraint to development is a shortage of water and an inadequate evaluation of the groundwater potential.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 1,810	600	800	N/A	1,719	(1980) 3,918	980	78
(1985 Actual) 2,600	850	1,200	360	1,900	(1985) 3,900	1,500	N/A
(1990 Targets) 3,000	1,300	1,500	800	2,000	(1990) 4,500	3,000	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
80	20	42	15

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,027
Investment totals (US $ millions 81-85)	22.98

Seychelles

Currency: Rupee 5.66 = US$1.00
Population: 65,240 (40% urban)
Official language: English
Population growth rate: 0.8%
GNP per capita: US$2,250
Life expectancy: 68 years
Infant mortality per 1,000 births: 18

UNDP resident representative: N/A

WATER AND SANITATION AGENCIES

Water & Sewerage Section (WSS), Public Works Department, Ministry of Planning & Development, Victoria, Mahé.

Ministry of Health, Victoria, Mahé.

The only urban area in the Seychelles is the capital, Victoria, on Mahé island. The rest of Mahé and the other islands are rural.

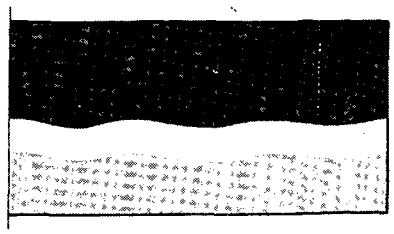
All of Victoria is served by piped supply, 80% through private connections to the mains. A minimum of 800 households have been added to the drinking water system yearly since 1977, when only 82% of the town had a piped service.

In the same year the government committed itself to a sewerage system to cover the whole of Greater Victoria. So far, this has not been implemented, but remains a target for 1990. In 1985, only public institutions in the city centre have sewered connections, and of the rest half use septic tanks and half pit latrines.

In the rural areas, sanitation coverage is said to be complete with a high proportion (26% in 1977) using flush toilets. Water services now reach 95% of the rural population compared with 68% in 1980.

Low-cost technology for water supply to the unserved marginal population has been looked at, including small package treatment plants.

Package sewage treatment plants have also been considered to supplement the proposed urban sewerage scheme, for high density areas where septic tanks could be a health hazard.



National planning

In 1980, virtually all the capital costs in the sector were met by foreign aid or government subsidy. Tariffs were introduced at the beginning of 1980 to recover costs, at least of operation and maintenance. The average tariff now stands at $0.5/m^3$, or about 83% of the operating costs.

The terrain in Mahé is difficult, and capital costs will probably always be too high to get an economic return on investment.

For capital works, the country has relied on external aid or interest-free loans. The La Gogue dam for instance was built with UK assistance.

The plan for 1990 is only partially complete, but broadly it envisages keeping pace with population growth (0.8% per year) in urban water supply, rural water supply and sanitation, with less people relying on standpipes in Victoria. By 1990, 90% of Victoria should be served by sewers instead of septic tanks and pit latrines.

The WSS, which administers all sector projects, is well staffed with 24 people qualified at technical level or above, 65 clerical staff and 169 artisans. There is no university in the country, and all qualifications must be gained overseas. In 1980, it was reported that expatriate support would be needed for some years.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
24.5	18.4	2.7	1	22	41.4	33	39
(1985 Actual)					(1985)		
26	21	5	2	24	39	37	39
(1990 Targets)					(1990)		
30	29	1	27	3	45	41	45

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
580	60	355	100	600	100

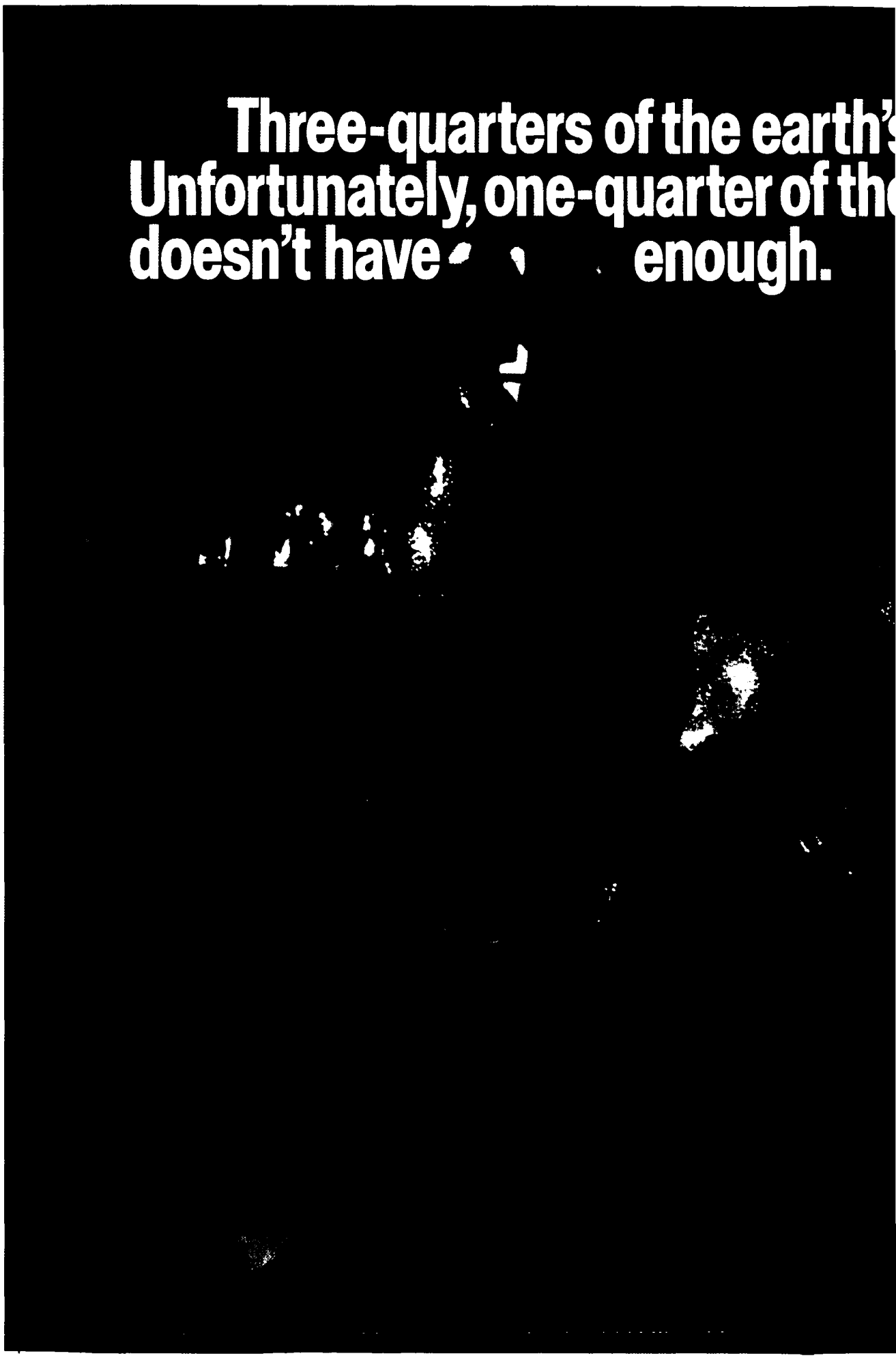
WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
195	149	180	135

UNIT COSTS OF WATER PRODUCTION (US$/$m^3$)

Average cost	Operation average water tariff	Progressive water tariff
0.60	0.50	YES

Three-quarters of the earth's
Unfortunately, one-quarter of th
doesn't have enough.



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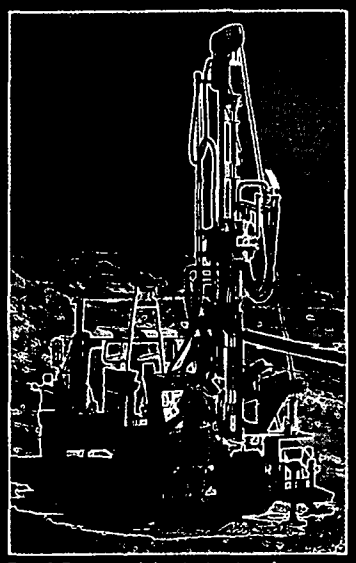

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Sierra Leone

Currency: Leone 33 = US$1
Population: 3,700,000 (30% urban)
Official language: Creole, English
Population growth rate: 2.32%
GNP per capita: US$200
Life expectancy: 47 years
Infant mortality per 1,000 births: 225
Water diseases per 100,000: N/A
Adult literacy (M/F): 38/21

UNDP resident representative: Bank of Sierra Leone Building, Siaka Stevens Street, PO Box 1011, Freetown

WATER AND SANITATION AGENCIES

Ministry of Energy & Power, Electricity House, Siaka Stevens St, Freetown.
Ministry of Health, Freetown.
Ministry of Agriculture & Forestry, Freetown.
Ministry of Development & Economic Planning, Freetown.
Ministry of Social Welfare & Rural Development, Freetown.
Ministry of Housing & Country Planning, Freetown
Guma Valley Water Company, Freetown.

One of the smaller West African countries, with a land area of 73,326km^2, Sierra Leione has abundant surface water, with 16 major rivers providing perennial supplies for agricultural and domestic needs.

Little groundwater investigation has been carried out, but abundant resources for future industrial expansion are believed to exist.

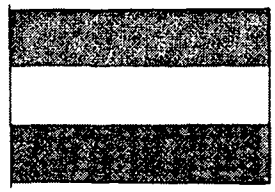
Approximately 70% of the 3.7M population is rural, and only a small proportion (less than 10%) has access to basic facilities, including safe water, sanitation, and basic health care.

In the towns, 68% of the people have an adequate water supply and 60% a means of sanitary disposal, although very few (0.06%) by connections to sewers. This is a considerable improvement on the situation in 1980, when 50% had safe water, and only 30% some form of sewage disposal.

Decade progress

The National Action Plan in 1980 aimed to provide safe drinking water to all the urban centres, and 60% of the rural population. Sanitation was to be complete in towns, and extended to about half the rural areas.

It was planned to spend $27.4M in the first five years of the decade, and actual investment totalled $28.8M, 81% of which was financed externally.



The "New Order" of President Momoh, which took effect in November 1985, resulted in a 12-month standby arrangement with the IMF for $27.9M, and a structural adjustment loan of $25.6M.

Urban water supply projects for five towns have French government backing ($5.5M). Study and design for new water supply systems at Binkolo, Rokupr and Daru are in progress, and have been completed at Lungi and Gorahan, where construction is imminent.

The EEC is backing a water supply project in Lungi, and the construction of a treatment works and distribution network for Njala. The combined cost, cofinanced with the government, is $1.5M.

For the rural areas, the first phase of a well construction programme, funded by UNDP, the EEC, CARE, and UNCDF, has been completed with 856 wells in Koinadugu, Moyamba, Bonthe, Magbosi, and the Northern and Eastern Provinces.

Preparatory work has started in four new areas with assistance from KfW, the EEC, ILO, and CARE.

The World Bank and IFAD are currently evaluating the second phase of the well construction components for the Magbosi and Northern Province Integrated Agricultural Projects, after disappointing results in the first phase.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	28.76

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
112	78	N/A	150	35	30

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 922.8	185	277	6	277	(1980) 2,238	45	134
(1985 Actual) 1,110	231	524	7	660	(1985) 2,590	189	259
(1990 Targets)					(1990)		

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
100	10-25	27-100	10

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.90	0.30	YES

Singapore

Currency: Dollar 2.14 = US$1.00
Population: 2,558,000 (100% urban)
Official language: English, Malay, Mandarin, Tamil
Population growth rate: 1.1%
GNP per capita: US$7,420
Life expectancy: 73 years
Infant mortality per 1,000 births: 9
Water diseases per 100,000: N/A
Adult literacy (M/F): 93/79

WATER AND SANITATION AGENCIES

Ministry of the Environment, 40 Scotts Road, Singapore 0922
Telephone: +65 732 7733
Telex: RS 34365 ENV

Ministry of Health, 55 Cuppage Road, Singapore 0922
Telex: 34360 MOHHQ RS

Public Utilities Board, 111 Somerset Road, Singapore 0923
Telephone: +65 235 8888
Telex: RS 34793 PUB

The Republic of Singapore is an island of 618km^2, entirely classified as urban, and divided administratively into the City of Singapore, four districts, and the southern island.

With no rivers of any significance, and barely any groundwater resources, Singapore has to rely on rainwater catchments and imports from the nearby Malaysian mainland. Yet virtually the whole population has treated water through house connections. Nearly 90% of the population is connected to modern sewerage systems, an improvement on the 1980 figure of 75%. It is planned that by 1990, the whole island will be sewered. For these reasons, the government considers it unnecessary to prepare decade targets and plans.

The Public Utilities Board is responsible for water supply, sewers, and solid waste disposal. The, Ministry of the Environment controls wastewater treatment to prevent pollution of valuable and limited surface catchments. The Ministry of Health monitors water quality.

Two methods are being used to meet increasing demand: wastewater recycling and urban catchment runoff collection. These techniques are also designed to reduce reliance on imports, which in 1986 accounted for 40% of Singapore's 848,000m^3/d demand.

Singapore operates and maintains four impounding reservoirs and two river intakes in South Johor on the Malay peninsula. It supplies the Malaysian city of Johor Bahru, and pipes the rest across to Singapore island. In 1986, Malaysia used exports of water as a bargaining counter in trade discussions on sales of natural gas to Singapore. Partly to extricate itself from a dependent position, Singapore has paid great attention to water conservation on the island.

A scheme to collect urban runoff water, estimated to cost $264M, was started in 1983 on 11 catchments in the northeast. Two reservoirs, centrally located Sungei Seletar and Bedok, and a treatment plant will be providing up to 137,000m^3/d by 1985.

Demand for water is also reduced by providing recycled water for non-potable uses. The Jurong Industrial Water Works produces 45,000m^3/d of reclaimed treated wastewater, and, in 1984, 37 factories used this source. The Ministry of the Environment's refuse incineration plant at Ulu Pandan also uses it for cooling, and 6,000 residential apartments use it for toilet flushing.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
459	-	331	-

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.24	0.29	N/A

ACTUAL AND TARGET LEVELS OF COVERAGE

	Urban population served (000's)				Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 2,414	2,402	12	1,936	N/A	(1980) -		
(1985 Actual) 2,558	2,557	1	2,276	253	(1985) -		
(1990 Targets) 2,710	2,710	-	2,710	0	(1990) -		

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	490.4*
Investment totals (US $ millions 81-85)	300

*urban water supply only

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
41	-	N/A	-	-	-

Solomon Is

Currency: Solomon $1.9 = US$1.00
Population: 249,000
Official language: English
Population growth rate: 3.4%
GNP per capita: US$601
Life expectancy: 54 years
Infant mortality per 1,000 births: 46
Water diseases per 100,000: 2,726
Adult literacy: 13%

WATER AND SANITATION AGENCIES:

Ministry of Transport, Works & Utilities, PO Box G8, Honiara.
Telex: HQ 66352

Ministry of Health & Medical Services, PO Box 349, Honiara.
Telex: HQ 66432

Ministry of Home Affairs & Provincial Government, PO Box G11, Honiara.

WHO Country Liason Officer, PO Box 22, Honiara.
Telephone: 23600

The six main islands of the Solomons, Choiseul, New Georgia, Santa Isabel, Guadalcanal, Malaita and Makira are surrounded by many smaller volcanic islands and atolls extending across 600,000km^2 of ocean in the west Pacific. The total population is 249,000.

The islands are subject to cyclones, and rainfall, which averages between 3,000mm and 3,500mm/year, is particularly heavy on the windward side of the main islands. Coastal areas which are sheltered from the prevailing winds are drier.

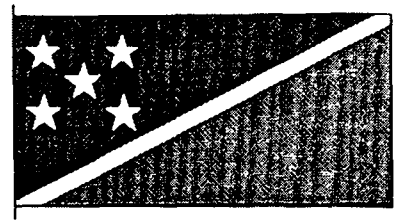
Most of the population lives in rural communities of about 50 people and about 10% in Honiaria, the capital city (population 20,000) and the seven provincial capitals.

Decade Progress

Up to the end of 1985, some 120,000 people (58%) had been served with potable water. The urban population has good access to water and 24,000 out of 25,000 people have house connections. Some 78% of the rural population were served with potable water at the end of 1986.

However, the population of the capital and the provincial capitals is growing fast and a major expansion of facilities is being undertaken with the assistance of a $1.6M loan from the Asian Development Bank. In rural areas, 100,000 out of a total rural population of 250,000 have reasonable access to safe water.

A WHO-assisted analysis of the water supply/sanitation sector carried out by the Ministry of Health and Medical Services almost 10 years ago showed that sanitation facilities were inadequate in both urban and rural areas. More recent statistics (1983) show that 20,000 of the urban population had some form of adequate disposal, not necessarily connected to public sewers. In rural areas, 48,000 had adequate facilities.



The sector study resulted in a proposal for a 12-year countrywide Rural Water Supply & Sanitation project, which is being implemented gradually as funds become available. A standard manual for rural water supply and sanitation projects has been developed and appropriate technologies are being widely used for rural water and sanitation projects.

Two government ministries are responsible for administering the programme: the Ministry of Home Affairs and Provincial Government is the accounting ministry controlling the finances of the project; and the Ministry of Health & Medical Services provides technical, logistical and training support through its Environmental Health Division.

The RWSS project is being implemented by the seven provincial governments with work coordinated by a national Water Resources Committee set up in 1979.

Upkeep of supplies is also the responsibility of the provinces or communities concerned.

A health education programme has been undertaken by the Solomon Islands Development Trust, a non-governmental organisation that aims to educate villagers in the proper use and importance of safe drinking water and sanitation facilities.

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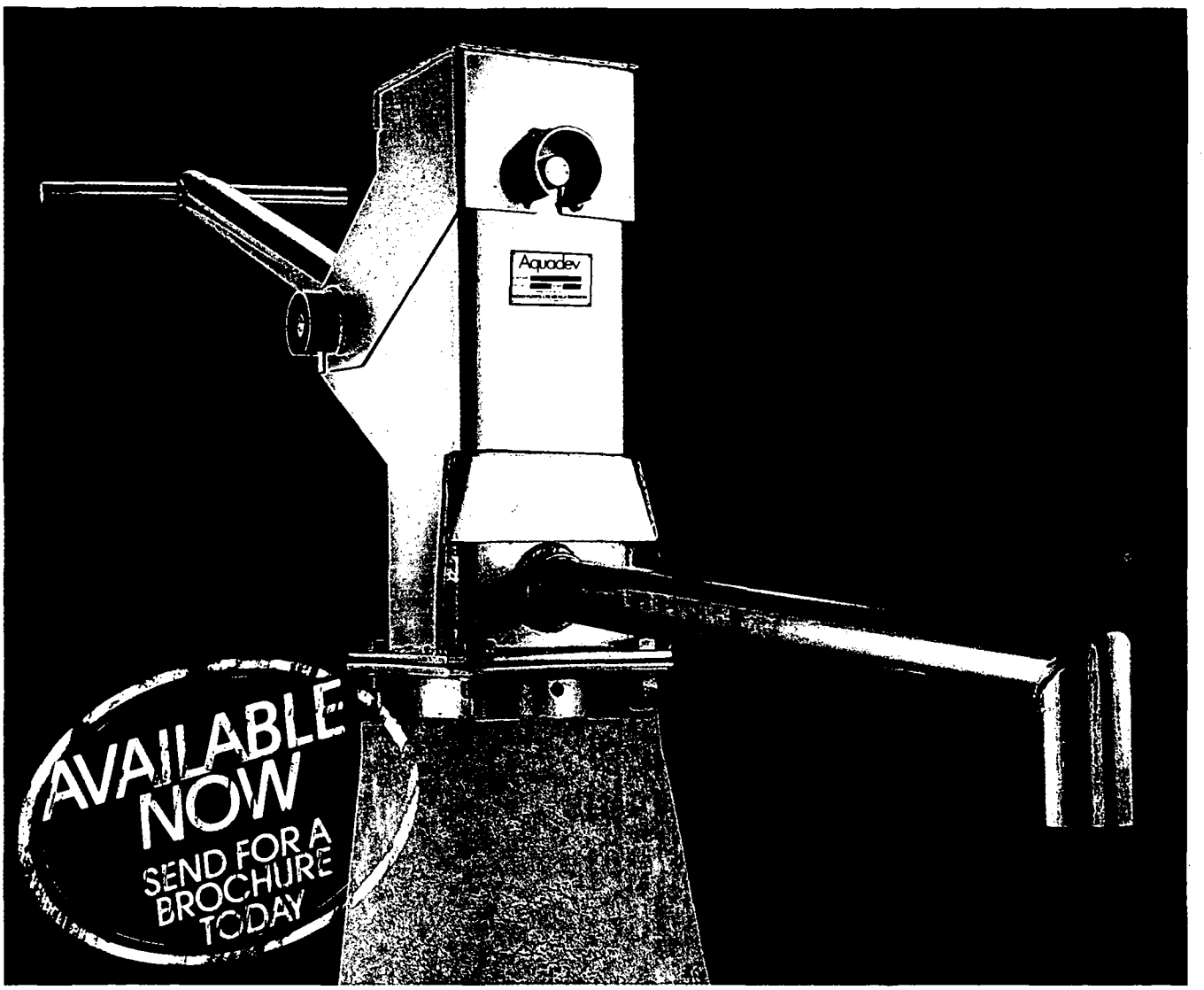

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Somalia

Currency: Shilling 120 = US$1.00
Population: 5.5 million (22% urban)
Official language: Somali (English, Italian and Arabic are spoken)
Population growth rate: 2.9%
GNP per capita: US$200
Life expectancy: 49 years
Infant mortality per 1,000 births: 170
Water diseases per 100,000: N/A
Adult literacy (M/F): 18/6

UNDP resident representative: UN Compound, PO Box 24, Mogadiscio, Somali Democratic Republic

WATER AND SANITATION AGENCIES

National Water Resource Committee

Ministry of Mineral and Water Resources

Water Development Agency

UN EXECUTING AGENCY 1987

Ministry of Juba Valley Development, Mogadiscio, Somali Democratic Republic

Situated on the Horn of Africa, Somalia is bordered to the north by the Gulf of Aden, to the east by the Indian Ocean and to the west and southwest by Ethiopia and Kenya. It has a land mass of 637,000km^2 and is composed largely of plateau sloping easterly from the northern highlands which run parallel to the Gulf of Aden.

Central and northern Somalia are arid (annual rainfall 50-300mm) and the south is semi-arid (annual rainfall 300-600mm). The only perennial rivers, the Juba and the Webbe Shibeli, both rise in the Ethiopian highlands. Rainy seasons are April-June and September-November, but rainfall is irregular and drought has been a recurrent and widespread problem over the past decade.

The people of Somalia are mainly nomadic pastoralists, and water is a basic necessity for socio-economic progress. Comprehensive hydrogeological studies are needed to determine the configuration and boundaries of known aquifers and to investigate promising formations which are potentially water-bearing.

Indiscriminate abstraction from aquifers, which may contain mainly fossil water, could lead to depletion of the groundwater supplies, and it is emphasised that water resources planning is essential and a monitoring network is needed if any sizeable drilling programme is to be undertaken.

With a per-capita income of less than US$300, Somalia is one of the least developed countries in Africa and has one of the world's highest rates of infant mortality (170 per 1,000 live births). Water- and sanitation-related diseases are rife and there is an evident need for drastic development efforts in the sector.

Sector responsibility

Development planning is the responsibility of the Ministry of National Planning. In the period of the Fourth Five-Year Plan (1982-86), water was allocated 10% of the total investment budget, with half of this going to drinking water supply and sanitation.

To elaborate the Decade Plan and monitor IDWSSD activities, the government created a National Policy Committee in November 1982 and a National Technical Committee has also been set up.

Decade plans

Two alternative plans for the Water Decade were worked out. The most ambitious alternative called for 100% coverage of the whole population with both water and sanitation facilities by the year 1990. The estimated cost of this was US$1,363.5M.

A more realistic plan requires investment of US$500M to reach its targets (urban supply 80% coverage, rural supply 42%; urban sanitation 12% sewer connections and 55% other means, rural sanitation 23% access to latrines). It is hoped that much of the investment required will be provided by external aid.

The government has stated that it will fund the maintenance of water supply and sanitation systems and that it will encourage communities to gradually take over the responsibility and to provide funds for the operation, maintenance and extension of their systems. Total recurrent costs for the Decade have been estimated at US$96.6M.

Particular attention is to be paid to rural and urban fringe water supplies and to the provision of sanitation facilities in the countryside. The concept is to develop these areas with low-cost, appropriately-designed and easily replicable installations. Another goal is to increase health education and maintenance by strengthening the sector's institutional infrastructure. Government policy is that the water tariff should be applied to all urban supplies, both private house connections and standposts, and to rural supplies according to the nature of the source.

Until recently, the various agencies involved in the water sector were free to construct wells and boreholes without reporting them to a central unit. Lack of coordination between the various agencies meant that there was no precise inventory of water points in rural

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual)					(1985)		
1,379	396	396	0	600	4,136	920	212
(1990 Targets)					(1990)		
1,588	564	689	188	877	4,763	2,631	1,210

Somalia (cont)

areas. A National Water Centre is planned to ensure close coordination of water use and management.

Nomads number about 3 million and, for purposes of Decade planning, they are considered as rural population attached to the existing 5,300 villages.

One of the Decade objectives is to provide each rural inhabitant (including nomads) with 25 litres of safe drinking water each day. Service is considered adequate if a dwelling is within 500m of a well. Water supplies should be designed and installed with a sufficient capacity to satisfy the combined needs of the static rural population and the nomads.

A total of 88 deep-well systems, 3,157 shallow wells (averaging 15m deep), 750 rainwater harvesting-cisterns, 400 infiltration gallery systems and 150 slow-sand-filtration systems is considered to be the optimum for the Decade.

The Government has opted for simple, replicable low-cost technology and will give priority to conventional man or animal driven pumps. Renewable energy, such as wind and sun power will be considered as far as is practical, although the limited experience of these methods and the relatively high initial investment costs may limit their practical application.

Gradual standardisation of the systems will help systematic maintanance, which is also to be given high Government priority. Local manufacture of rural water supply equipment is to be encouraged and community participation promoted.

Almost 50% of the urban population lives in Mogadiscio and Hargeis, and the remaining number live in 69 urban centres, many of which have populations of less then 5,000. For the purposes of Decade planning, the government is considering a redefinition which would designate only towns with close to or more than 5,000 inhabitants as urban centres.

Eighty per cent urban coverage for drinking water is envisaged in the revised Decade plan. This will involve reinforcement of existing systems, rehabilitation of old ones, and selective construction of new supply schemes in towns.

Water supply schemes for Mogadiscio, Hargeisa and Mismayo are managed by separate entitities and it is envisaged that by 1990 the Water Development Agency will extend its activities to all towns without separate water-supply bodies.

Institutional responsibilities for sanitation are not clearly defined and government intends to create a national structure to streamline the roles and activities of the various agencies involved.

Development of the subsector will involve:- masterplans for 70 district and regional capitals; construction of surface rainwater drainage schemes in 20 towns and in Mogadiscio; partial sewerage for Mogadiscio, Hargeisa, Buao, Berbera and Mismayo; a latrine programme for the people in urban and rural areas who cannot afford to finance their own latrines; and a health education programme which will be coordinated by the Ministry of Health.

Various international development agencies are assisting Somalia in the vast task of improving water supply and sanitation. The German Agency for Technical Cooperation (GTZ) is supplying training and technical assistance and the United States Agency for International Development is providing drilling rigs and other assistance to WDA for two rangelands and agricultural projects. China (People's Republic) has financed construction of some water supply schemes for urban and rural areas. A pilot slow-sand-filtration plant has been built with assistance from UNICEF and WHO and is intended to supply Coryole district.

If Decade targets are to be reached, very substantial additional foreign investment is needed.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
130	90	400	400	100	30

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
30–130	25	25	15

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.16	NO

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	500
Investment totals (US $ millions 81-85)	N/A

Central Environmental Authority, Colombo

Mahaweli Development Board, 11 Jawette Road, Colombo 5

Greater Colombo Economic Commission, Colombo

Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
3,800		2,470	250	2,790	10,900	1,960	6,870
(1985 Actual)					(1985)		
3,400	868	1,914	258	1,950	12,460	3,620	4,840
(1990 Targets)					(1990)		
3,800		3,800		3,800	13,800	6,900	13,800

Spain

Currency: Peseta 128 = US$1
Population: 38,602,000
Official language: Spanish
Population growth rate: 0.56%
GNP per capita: $4,256
Life expectancy: 75 years*
Infant mortality per 1,000 births: 10*
Water diseases per 100,000: 4,942
Adult literacy (M/F): 97/92*

*UNICEF statistics (1985)

WATER AND SANITATION AGENCIES

Ministerio de Sanidad y Seguridad Social,
Plaza Prado, 18, 4th Floor,
Madrid.
Telex: 22608 MSASS E

Ministerio de Obras Públicas,
Plaza de la Castellaña, 67, 3rd floor,
Madrid.
Telex: 46388 PMOP E

Ministerio de Trabajo,
Plaza de la Castellaña, 3,
Nuevos Ministerios,
Madrid.
Telex: 45843 MTMD E

The definition of "urban" for water supply purposes covers communities with more than 50 inhabitants and the Ministry of Health & Consumer Affairs believes that only 1% of these populations have any serious problems with water supply.

Water supply and sanitation infrastructure are all municipal responsibilities; the national authorities only provide economic and technical support. However, because water supply and sanitation are national concerns, the government can intervene to satisfy national requirements.

In 1967, the Ministry of Public Works & Urbanism drew up the Water Supply & Sanitation National Plan (PNAS). Its major goal was to balance public demand with health requirements and to make recommendations to guarantee these. Health authorities have been working to these guidelines since then.

When the PNAS was drawn up, the following estimates were made: 64% of the population had house connections; 71% were supplied through a community system; 60% had a sewer service.

Only a small proportion of this population had prior freshwater treatment and wastewater treatment was practically non-existant.

Since that time, the above percentages have improved to 75%, 85% and 70% respectively, and construction of

wastewater treatment plants for cities with more than 800,000 people is well under way.

Investment

During the first four years of the Decade (1981-4), total investment by the Ministry of Public Works in sewerage and supply works totalled 70,000M pesetas. This was matched by the municipal and regional authorities and public institutions. Driven by demands from the tourist industry, the ministry built wastewater treatment plants covering the needs of 6 million inhabitants and new plants are in construction covering a further 3 million people.

For the rest of the Decade, the ministry's annual goal is to build annually wastewater treatment plants and other facilities to satisfy 1.5 million people.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
66.00	N/A	N/A	N/A	N/A	N/A

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
N/A		230	150

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.22	N/A	certain areas

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)	Rural population served (000's)

Sri Lanka

Currency: Rupee 29 = US$1.00
Population: 15,860,000 (22% urban)
Official language: Sinhala
Population growth rate: 1.2%
GNP per capita: US$340
Life expectancy: 68.5 years
Infant mortality per 1,000 births: 32
Water diseases per 100,000: 1,024
Adult literacy (M/F): 91/83

UNDP resident representative: 204 Bauddhaloka Mawatha, PO Box 1505 Colombo

WATER AND SANITATION AGENCIES

Ministry of Local Government, Housing & Construction, Colombo

Ministry of Health, Colombo

State Planning Corporation, Ministry of Plan Implementation, Colombo
Telex: 21232 FORAID CE

National Water Supply & Drainage Board, Ratmalana

Water Resources Board, Ministry of Land & Land Development, 500 TB Jayah Mawatha, PO Box 512 Colombo 10

The island of Sri Lanka covers 65,610km². Main sources of surface waters are 103 rivers; groundwater potential is good, but mostly from consolidated formations. Coastal areas face saltwater intrusion.

Rainfall varies from 2,395mm annual average at the capital Colombo on the southwest coast, to 1,726mm at Trincomalee in the northeast, and about 1,000mm in the southeast and northwest, in the shadow of the monsoon.

About 82% of the urban population is said to have access to a safe water supply, but less than half of those from an individual piped connection. This compares favourably with 1980, when 68% of people in towns had safe water. In rural areas too, the provision of a satisfactory water supply is more widespread, serving 29% now compared to only 18% in 1980, in spite of an increase in the rural population in the meantime of 805,000 people.

By contrast, sanitation has hardly progressed at all in terms of the absolute number of people served, which means that the proportion of the population served has actually fallen a couple of percentage points in both the cities and the country. About 65% of households in the towns have some form of sanitation, but very few (8%) are connected to municipal sewers. Only about 39% of the rural population is estimated to have adequate sanitary provision.

The National Water Supply & Drainage Board is by far the largest employer in the sector, with wide responsibility from loan negotiation through to operation and maintenance of all schemes except rural sanitation. The Ministry of Health is in charge of rural sanitation, and cooperates in rural water supply. This ministry also makes checks on water quality, both urban and rural, but not routinely. The Central Environmental Authority has recently been established for the sole function of water quality control.

A National Action Committee for the Water Decade was set up in 1979, chaired by the Secretary to the Ministry of Local Government, Housing & Construction, but is said to meet infrequently. The Decade Plan, adopted by the government in 1980, and with one exception not revised since, envisages full piped water service in towns by 1995, and at least adequate access to safe water in all urban areas by 1990. Half the rural population should have safe water by the decade end, and it is not expected that full coverage will be achieved before 1995.

The urban sanitation target is full coverage by 1990, but by what means is not specified. Rural sanitation, not expected to be complete under the 1980 Plan before 1995, is now planned to cover the whole population by 1990.

In 1980 it was estimated that $921M was needed to reach the decade targets. So far, $211M has been spent, more than half ($110M) financed externally. The principal donors have been the International Development Association ($39M), Saudi Arabia ($28M), France ($23M), the USA ($15M), and Finland ($12M). Other contributions have come from Japan, Denmark, the European Economic Community, Canada, the UK, China, West Germany, Norway, the Netherlands, and UN Organisations, in that order.

In 1986, the IDA approved a further credit of $37M towards a $65M project for water supply and sanitation in three cities, the capital Colombo, Amparai, and Anuradhapura. The project includes a component to strengthen the operations of the NWSDB, which reports inadequate cost recovery as its most serious constraint.

However, the NWSDB has made progress in its staffing policy in the first five years of the decade, more than doubling its establishment to nearly 4,000 staff in all grades.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)	Rural population served (000's)

Sudan

Currency: Sudanese Pound 2.45 = US$1
Population: 21.9 million (21% urban)*
Official language: Arabic
Population growth rate: 2.9%*
GNP per capita: US$300
Life expectancy: 49 years**
Infant mortality per 1000 births: 122*
Adult literacy (M/F): 41/21

*World Bank, 1985
**UNICEF, 1985

UNDP resident representative: House 7 Block 5, Gama's Avenue, PO Box 913 Khartoum

WATER AND SANITATION AGENCIES

Rural Water Corporation, PO Box 381, Khartoum

National Water Board, PO Box 1380, Khartoum
Telephone: 81021

The largest country in Africa, Sudan has an area of 2.5 million km^2; shared borders with Ethiopia, Kenya, Zaire, Central African Republic, Chad, Libya and Egypt; and an outlet to the Red Sea on which Port Sudan is sited.

There is a high incidence of water-related disease with malaria and schistosomiasis endemic in all provinces.

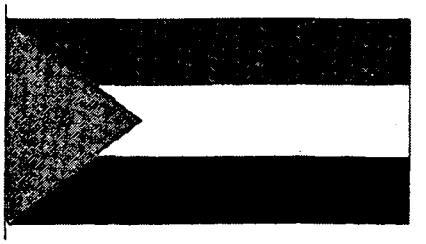
Civil war currently affects every aspect of Sudanese life. Strife between north and south has been a long standing problem and a state of civil war has existed since 1983 when the north-based government imposed Muslim Sharia law on the predominantly Christian south.

The war is having a severe effect on the country's ability to recover from the 1984/85 drought and from years of serious drought since the 1970s.

Despite good rains in 1986 and record harvests of sorghum there were still fears throughout 1986 and 1987 that two million people risked starvation, mainly because of poor transport communications throughout the country. In addition attempts to send in relief planes to the rebel-controlled territories in the South have met with distrust from both Khartoum and the Sudan People's Liberation Army.

Water resources

Water, like everything else, has become a source of conflict between North and South. The South, with its tropical climate, has reasonable rainfall while the North is hot and dry. The Jonglei Canal project which aimed to



drain swamp areas in the South for transportation to the North has had to be abandoned. The 220km canal would have supplied the north with water, and provided an excess for export to Egypt, but the SPLA have been hostile to the project, claiming that it was displacing pastoralists and providing no wealth for the south generally.

Sudan is also two nations in terms of drinking water supply. While almost half the population - urban and rural - had access to clean water at the start of the Decade the main beneficiaries were the north. In the south only 17% of the urban population and 7% of rural dwellers had reasonable access to safe water.

Funding problems

Funding for water supply projects may also be difficult. Sudan is Africa's most indebted nation and by 1987 had fallen seriously in arrears with debt repayments in 1987 while arrears had reached $3,500 million. The 1987 budget allocated about US$575 million to debt servicing and only about US$380 million to development expenditure.

Suriname

Currency: Guilder 1.7 = $1.00
Population: 402,000
Official language: Dutch
Population growth rate: 3%
GNP per capita: $3,030
Life expectancy: 65.5 years
Infant mortality per 1,000 births: 340
Water disease per 100,000: N/A
Adult literacy (M/F): 65

WATER AND SANITATION AGENCIES

Ministry of Public Works, Telecommunications & Architecture, PO Box 2110, Paramaribo

Ministry of Natural Resources & Energy, Paramaribo

Ministry of Health & Environment, Paramaribo

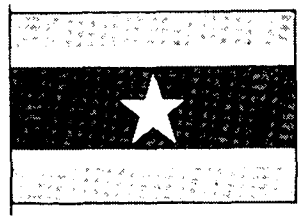
A former self-governing territory of the Netherlands, Suriname became independent in 1975; it covers a land area of 163,000km^2 on the north-east coast of South America.

There are several large perennial rivers used for water supply in the interior, but the brackish water line extends 50-75km inland so that the more heavily population coastal areas cannot rely on these sources for water supply.

The Morawine river on the country's eastern border is used for water supply along coastal areas, but elsewhere the main source is groundwater.

A 1983 government report stated that there were about 50 water supply systems operating in Suriname under the responsibility of the Suriname Water Company, in Paramaribo - the capital - Nieuw Nickerie and Albina. The Water Supply Service at the Ministry of Natural Resources and Energy was responsible for a further 35 systems in rural areas.

In 1985, 2.5% of the population were without safe water supplies and, according to official statistics, the entire population had access to sanitation services. Likewise, 100% of the urban population had water supplies by house connection, 2% had sewer connections and 98% had sanitation services by other means. In the rural areas, 94% of the population had water supplies and 100% had sanitation facilities.



Aims established for the Water Decade include the provision of sewer connections for 10% of the urban population by 1990, with 67% having adequate services by other means.

The 1983 report referred to above, noted that there is risk of groundwater contamination in Suriname because of the high water table and shallow wells were frequently contaminated. Overflowing latrines in the rainy season is another problem. An insufficient number of health inspectors makes the construction of adequate excreta disposal systems for rural areas difficult.

Plans for improving the Paramaribo sewerage system were drawn up by consulting engineers who recommended improvements to the capital's discharge system by separating storm and drainage and sewage. However, the government notes, such a system in coastal areas would be difficult to implement. Such improvements as those recommended for Paramaribo, however, would need external assistance from some source.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(1985 Actual)					(1985)		
242	240	2	6	236	160	150	160
(1990 Targets)					(1990)		
300	300	0	30	200	250	240	20

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
525	195	150	50	85	50

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
125	100	115	100

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.60	0.80	some areas

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	39

Swaziland

Currency: Lilangeni 2.06 = US$1
Population: 0.65M (15% urban)
Official language: English, Siswati
Population growth rate: 3.5%
GNP per capita: US$810
Life expectancy: 48 years
Infant mortality per 1000 births: 105
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

UNDP resident representative: Embassy House, Morris Street, Private Bag, Mbabane

WATER AND SANITATION AGENCIES

Ministry of Natural Resource, Land Utilization and Energy, Private Bag, Mbabane,
Telephone: 64244
Telex: 2301 WD

Water and Sewerage Board, PO Box 20, Mbabane,
Telephone: 43161
Telex: 2141 WD

Rural Water Supply: PO Box 961, Mbabane,
Telephone: 23231

The small kingdom of Swaziland occupies 17,363km^2 and shares a short border with Mozambique, but is virtually encircled by South Africa. Swaziland's main agricultural export is sugar but about 50% of the rural population is engaged in subsistence farming. The climate is semi-temperate in Mbabane and the high veld, and drier elsewhere. Temperatures range from 7-10°C with occasional frost during April to September and 20-30°C in the summer months of September to March.

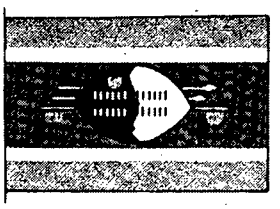
In 1985 the population without safe water was over 78% and with inadequate sanitation 64%. Decade targets were for 100% urban coverage in water supply and sanitation; for rural water supply 50% coverage; and for rural sanitation 35%. The urban population is expected to grow to 112,000 by 1990 and the rural population from 553,000 to 636,000.

Water supply

The 98,000 urban population in 1985 all had access to clean water, 84% by house connection and the remainder by public standpost. By 1990 Swaziland aims to supply the total urban population of 112,000 by house connection. However, only 7% or 40,000 of the rural population had access to clean water. Plans are only to increase this to 8% or 50,000 of the 1990 population.

Sanitation

Urban sanitation targets were 100% coverage, 40% by sewer connections and the remaining 60% by other means. Coverage was considered to be 100%



already in 1985 but with 33% or 32,000 by sewer connection and 67% by other methods. Of rural dwellers, 25% or 138,000 people were thought to have access to adequate sanitation.

Decade approaches

Swaziland was in the process of modifying an initial Decade plan in 1987. A training budget has been established but is not considered sufficient. Swaziland has estimated that per capita costs of constructing new rural water supply systems are about US$40. The cost of providing adequate sanitation in rural areas averages US$1.60 per person.

The government estimates that 50% of the 45,000 urban poor have benefitted from Decade initiatives during 1981-5. All rural communities are involved in planning, building and operation of any projects for their use.

Almost all children receive health education, the government reports, while the involvement of women in water supply and sanitation programmes is generally encouraged.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)		N/A			(1980)	N/A	
(1985 Actual)					(1985)		
89	84	14	32	66	553	40	138
(1990 Targets)					(1990)		
112	112	0	40	60	636	50	35

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
200	25	200	10

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
-	0.16	YES

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	N/A	N/A	40	1.6

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3. Illustration - CIRCOJET filter tower for filtering day water of high river load content. Complete with auxiliary equipment, reagent feeding suitable to produce water of drink water quality.

DECARBONATOR: a traditonal lime saturation water softener with slow reactor, the partial units are mounted into a complete block in the factory.
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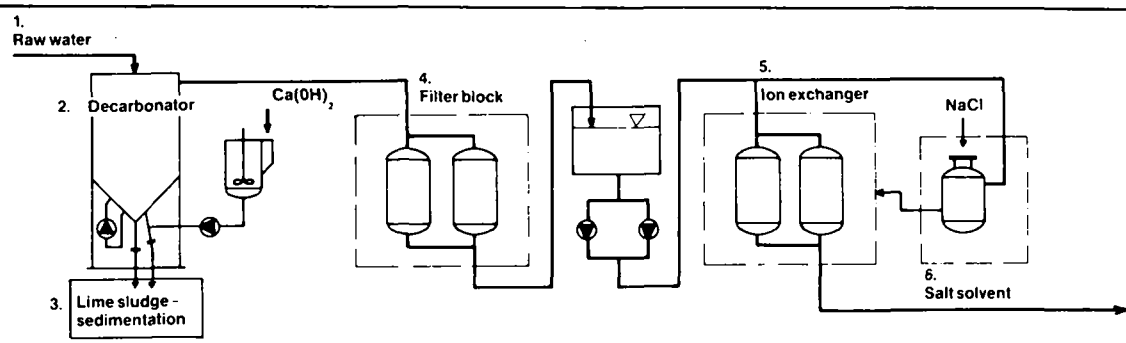
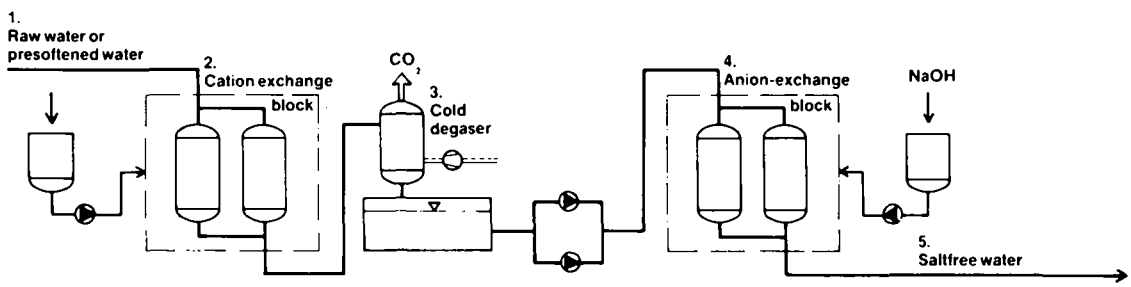
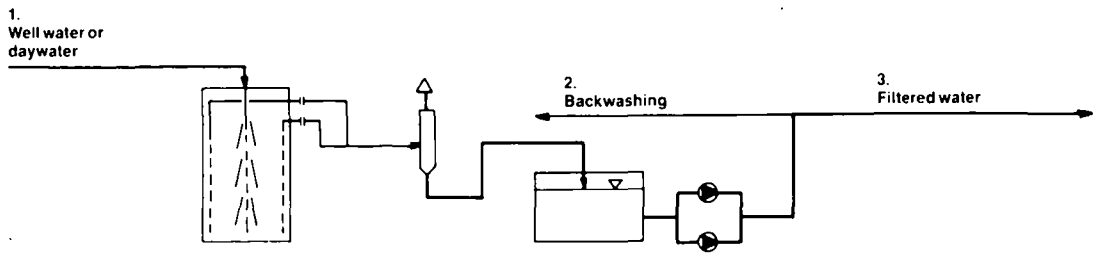






For further information circle Inquiry card No 408

Sweden

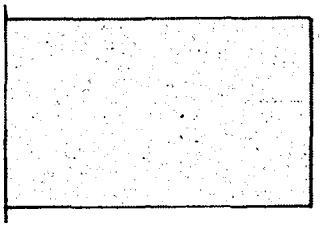
Currency: Krona 6.37 = US$1.00
Population: 8.36 million (83.5% urban)
Official language: Swedish
Population growth rate: N/A
GNP per capita: $11,890*
Life expectancy: 77*
Infant mortality per 1,000 births: 6**
Water diseases per 100,000: N/A
Adult literacy: N/A

*World Bank (1985)
**UNICEF (1985)

In 1985, all but 1% of Sweden's urban dwellers had access to public water supply systems via house connections, the remainder being supplied via private sources. Public supplies in rural areas, however, only accounted for 14% of the population, with the remainder being supplied from private wells, reservoirs etc.

Total amount of water supplied in urban areas in 1985 was 2.5M.m^3. Because of the diversity of sources, no figures are available for rural areas.

Everyone in Swedish urban areas has WC facilities connected to the public sewerage network. All sewerage is treated, 98% of it to secondary level, with 80% receiving additional chemical treatment.



In rural areas, however, only about 7% of the population live in homes connected to the public sewerage network. Some 83% have private excreta disposal systems such as a septic tank, while 10% have no sanitation system other than a latrine.

Total sewage discharged in Sweden in 1985 was 2.7M.m^3 of which 2.6M.m^3 was treated.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
6,912	N/A	N/A	N/A	N/A	1,406	N/A	N/A
(1985 Actual)					(1985)		
6,978	6,978	-	6,978	-	1,379	1,379	1,379
(1990 Targets)					(1990)		
7,056	7,056	-	7,056	-	1,344	1,344	1,344

WATER AND SANITATION AGENCIES

Statens Planwerk (National Board of Physical Planning & Building), Box 12513, S-102 29 Stockholm
Telephone: +46 (8) 737 55 00

VAV Svenska Vatten och Avloppsforeningen (Swedish Water and Wastewater Works Association), Regeringsg 86, S-111 89 Stockholm
Telephone: +46 (8) 23 29 35

Statens Naturvårdsverk (National Environmental Protection Board), Box 503, S-171 25 Solna
Telephone: +46 (11) 15 80 00
Telex: 11131 ENVIRON S

Switzerland

Currency: Swiss Franc 1.52 = US$1.00
Population: 6,500,000 (42% urban)
Official language: French/-German/Italian
Population growth rate: 0.4%
GNP per capita: $14,764,000
Life expectancy: 75.75 years
Infant mortality per 1,000 births: 6
Water diseases per 100,000: 0
Adult literacy (M/F): 100%

WATER AND SANITATION AGENCIES

Bundesamt für Umweltschutz Office Fédéral de la Protection de l'Environnement, Hallwylstrasse 4, CH-3003 Berne, Switzerland.
Telephone: +41 (31) 61 93 11

Bundesamt für Gesundheitswesen/Office Fédéral de la Santé Publique, Postfach 2644, Bollwerk 27, CH-3001 Berne, Switzerland
Telephone: +41 (31) 61 95 11

Schweizerischer Verein des Gas- und Wasserfaches (SVGW), Postfach 658, Grütlistrasse 44, CH-8027 Zürich, Switzerland
Telephone: +41 (1) 201 56 36

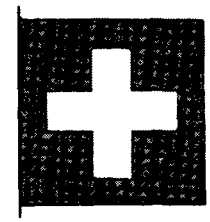
Eidgenossische Anstalt für Wasserversorgung, Abwassereinigung und Gerwässerschutz (EAWAG), Überlandstrasse 133, CH-8600 Dübendorf, Switzerland
Telephone: +41 (1) 823 55 11

Around three-quarters of Switzerland's population now receives drinking water piped from water purification plants. These have received an investment during the last 20 years of some SwFr20,000M (US$13,000M).

However, though it it true that 100% of the country's urban dwellers receive piped water, no official figures are available for the 58% of the total population who live in rural areas.

Local communities are involved in all aspects of water supply and sanitation including planning, design, construction, operation and maintenance. Overall planning, however, rests with the federal and cantonal (regional) Departments of Environmental Protection along with the Schweizerischer Verein des Gas- und Wasserfaches (SVGW) which assists with water project planning and design.

Planning and design of sanitation projects is the responsibility of the



Federal Institute for Water Resources & Water Pollution Control. This institute combines with the Federal Institute of Technology for the purpose of groundwater exploration.

Water quality control is the responsibility of the Federal Department of Health and cantonal chemists (regional laboratories). Quality surveillance of urban and rural water supplies is carried out on a routine basis and there is a water supply and sanitation service data collection and information system in existence.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
2,746	2,746	—	2,471	275	3,639	N/A	N/A
(1985 Actual)					(1985)		
2,732	2,732	—	2,595	137	3,773	N/A	N/A
(1990 Targets)					(1990)		
2,700	2,700	—	2,565	135	3,900	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
22.0	—	N/A	—	32.0	62.0

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
N/A	N/A	475	500

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.33	0.32	Some Areas

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	—
Investment totals (US $ millions 81-85)	3,189

Syria

Currency: Pound 3.92 = US$1.00
Population: 10.5 million* (47% urban)
Official language: Arabic
Population growth rate: N/A
GNP per capita: $1,570*
Life expectancy: 64 years
Infant mortality per 1,000 live births: 54**
Water disease per 100,000: N/A
Adult literacy (M/F): 76/43
UNDP resident respresentative: 28 Al Jala's Street, PO Box 2317, Damascus

*World Bank (1985)
**UNICEF (1985)

WATER & SANITATION AGENCIES

Ministry of Housing & Utilities, Damascus
Telex: 22194

Ministry of Public Works & Water Resources, Damascus
Telex: 223595

Ministry of Health, Damascus
Telex: 333800

Drinking water supply and sanitation are among the main services provided under successive five-year plans. The current plan, the Sixth, will run until the end of the Decade.

Water supply services are led by the Ministry of Housing & Utilities, which is responsible for technical studies on water projects, technical supervision, guidance, general planning and monitoring of implementation at the country level, as well as for raising the efficiency of the employees of this sector through training and qualification on a continuous basis.

Affiliated to the Ministry are Water Supply Public Institutions in the capitals of governates. Rural supplies are the responsibility of the Technical Services Directorates in the Governates. In cities and towns, municipalities also have responsibilities.

Latest figures available only cover the period up to 1983, when, in the cities and the capitals of governates, 79% of the population had a safe water supply. The aim was to raise this to 100% by 1985. Quantities per capita were also to be raised from 145 litres/d to 170 l/d. However, in the city of Lattakia, this had already been surpassed with a supply of 175 l/d per capita. Equivalent figures for Damascus and Aleppo were 165 l/d and 144 l/d respectively.

In rural areas, 61% of the population were covered in 1983 with a per capita share of 87 l/d. This was to rise to 67% and 96 l/d per capita in 1985. Some 2.4 million people in rural areas do not yet have a safe supply.

Increased attention has been paid to the sanitation sector in Syria following increased pollution, partly to increase the availability of water for drinking. This has resulted in increased emphasis on proper saline water disposal, treatment and recycling.

The Ministry of Housing & Utilities again studies, implements and supervises major projects and treatment plants, as well as studying projects required by some municipalities.

The governates' Technical Services Directorates are responsible for project studies, implementation and supervision, as far as their available sources permit, particularly in third and fourth degree municipalities. In larger municipalities, the municipalities themselves are responsible for project studies, implementation and supervision. They sometimes ask the Central Department to help them with the study of major projects that they cannot do themselves.

In 1983, the percentage of beneficiaries with suitable sanitation had increased to 66% in the capitals of governates and 29% in rural areas. The percentages vary between governates, being as high as 70% in some such as Damascus and as low as 10% in others such as Deir El-Zour, Deraa and El Hasaka.

Total investment in water supply and sanitation projects during 1980-83 was US$545M of which $220M was loans. Much of this was spent on treatment plants at Damascus, Aleppo, Homs, and Hama as well as two supply projects at Damascus and Hama.

Studies are under way to determine urban and rural water consumption tariffs. The production cost of water per cubic metre in 1983 was US$0.35 and the tariff per cubic metre was about $0.125.

Tanzania

Currency: Tanzanian Shilling 64.53 = US$1.00
Population: 21.94 million (16% urban)
Official language: Kiswahili, English
Population growth rate: 3.2%
GNP per capita: US$290
Life expectancy: 51 years
Infant mortality per 1000 births: 103
Water diseases per 100,000: N/A
Adult literacy (M/F): 90/80

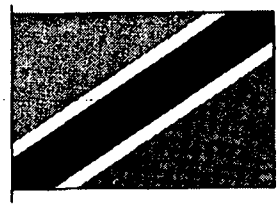
UNDP resident representative: Matasalamat Mansions, Zanaki Street, PO Box 9182 Dar-es-Salaam

WATER AND SANITATION AGENCIES

Ministry of Water and Energy (MAJI), PO Box 9153, Dar es Salaam
Telex: 31433

Ministry of Lands, Housing & Urban Development, Dar es Salaam

Categorised as a "least developed country", Tanzania covers an area of 945,000km^2. Its population is largely rural (84%) and agriculture contributes 80% of export earnings. After several years of debate Tanzania reached agreement with the International Monetary Fund in 1986 and has since been promised considerable support by Western donors.



Water supply

In 1980 82% of the urban population and 28% of the rural population had access to adquate drinking water. The government reported in 1985 that slightly under half the population had access to clean water. Of urban dwellers, 90% or 3,155,000 people had access to water. Of urban dwellers, 56% were supplied by house connection while 34% had access to standpipes. This is a significant improvement over 1980 when the country reported that 25% of urban dwellers were supplied by house connection. Some 42% of rural dwellers (7,700,000) had a safe water supply and this is also a considerable improvement over the 1980 figure of 28% (4,500,000).

Sanitation

Overall 36.4% of the population is without adequate means of sanitation. In urban areas 12% of the population is supplied by house connection while 81% rely on other methods. In rural areas the estimate of those covered by adequate sanitation methods is 10,689,000 or 58%.

Approaches

The country reports that the per capita cost of supplying water by house connections is US$85 with supply by standpost not much less at US$60. The cost per person of supplying protected water in rural areas is also estimated at $60, while the average cost of providing rural sanitation is estimated at $35.

Tanzania reports some level of rural community participation in water and sanitation improvements notably in the construction of facilities where 25% of communities become involved.

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
130	25	130	25

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
N/A	0.17	NO

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 2,184	546	1,274	266	1,798	(1980) 16,250	4,500	6,500
(1985 Actual) 3,510	1,950	1,205	421	2,843	(1985) 18,430	7,700	10,689
(1990 Targets)		N/A			(1990)	N/A	

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
85	60	N/A	N/A	60	35

Thailand

Currency: Baht 25.8 = US$1.00
Population: 51.8M (25% urban)
Official language: Thai
Population growth rate: 1.7%
GNP per capita: $729
Life expectancy: 63 years
Infant mortality per 1,000 births: 12.3
Water diseases per 100,000: N/A
Adult literacy (M/F): 94/88

UNDP resident representative: GPO 618, Bangkok

WATER AND SANITATION AGENCIES

Metropolitan Waterworks Authority (MWWA), 372 Siyak Mansri, Sapan Dam, Bangkok 10100
Telephone: 223-0041/9
Telex: 82384 METWAT

Provincial Waterworks Authority (PWWA), 72 Thanon Chaeng Watana, Lak Si, Bang Khen, Bangkok 10210
Telephone: 551-1239

Department of Health, Rural Water Supply Division, Wang Devavesm, Thanon Sam Sen, Bangkok 10200
Telephone: 282-7136

The Kingdom of Thailand covers an area of 514,000km^2. The terrain is mostly flat with scattered hills and small mountains in the southern and north eastern regions and higher mountains in the central region.

Major rivers are well distributed throughout the country. Rainfall is high (annual average 1,000mm in the north and 2,000mm in the south), but some areas have a marked dry season for up to seven months, in which shallow wells dry and only irrigated farming is possible. Groundwater resources have been assessed sufficiently to identify priority areas for development.

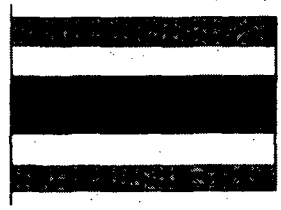
The country is divided into 72 provinces, 596 districts, 5,613 *tambons*, and 81,810 villages. The rural population accounts for 75% of the total, and, in 1980, 21% lived in communities of less than 500 people, 62% in towns of 500-2,000 inhabitants, and 17% in towns of more than 2,000.

Bangkok metropolis has a population of nearly 6 million, and the next most populous city, Chiang Mai, 110,000.

In the cities, the proportion of people with safe water supplies has declined from 64% in 1980 to 56% in 1985, in spite of efforts to keep pace with growth. In the rural areas, provision has improved slightly, from 64% coverage in 1980 to 66% today.

Urban sanitation has, however, improved from 64% of the population served in 1980 to 78% in 1985. Similarly, rural sanitation now reaches 46% of the population compared with 42% in 1980.

New targets for 1990 were set in 1984. By the end of the Decade, 67% of the urban population and 95% of the rural population should have safe water supplies. Sanitary disposal facilities should have been provided for 83% of the urban population and 75% of the rural population.



The plan's emphasis on the rural areas is deliberate, as the Metropolitan and Provincial Waterworks Authorities have their own longterm plans for urban areas. These utilities have continuing construction programmes for Bangkok water supply and sewerage, and upgrading 125 other municipal systems.

Strategy and approach in the rural areas is in line with the country's Rural Development Programme, which gives priority to areas of poverty, self-help, low-cost and appropriate technology.

In 1980, per-capita construction costs (excluding labour) were: $1.2 for conversion of a dug well with a PVC handpump; $15 for a small diameter tubewell with simple handpump; $31.4 for family rainwater storage; and $35 for a simple piped supply. Costs for rural sanitation were: $1.8 for a single pit without and $3.6 with superstructure.

Investment needed

It was planned to spend $215M on rural water supply under the Fifth 5-year Plan which expired in 1986. Figures for the Sixth Plan are not available.

Tariffs cover the costs of operation and maintenance: all urban consumers and a large number of rural consumers pay for their water by meters.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
- 52 -		-	20	3-56	17

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
150	50-80	100-150	50-80

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
11,000	7,000		7,000		36,000	23,000	15,000
(1985 Actual)					(1985)		
12,878	7,200		10,000		38,918	25,700	18,000
(1990 Targets)					(1990)		
14,400	9,600		12,000		42,000	39,900	31,500

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.21	0.21	YES

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,739*
Investment totals (US $ millions 81-85)	460*

*without urban sanitation

Togo

Currency: CFA Franc 307 = US$1
Population: 3,068,000 (33% urban)
Official language: French
Population growth rate: 2.8%
GNP per capita: US$300
Life expectancy: 46 years
Infant mortality per 1,000 births: 90
Water diseases per 100,000: N/A
Adult literacy (M/F): 53/28

UNDP resident representative: 40 Avenue des Nations Unies, BP 911, Lomé

WATER AND SANITATION AGENCIES

Direction de l'Hydraulique et de l'Energie, Ministère du Plan et des Mines, Lomé.
Telephone: 21 11 01

Régie Nationale des Eaux, Ministère des Sociétés d'Etat, Lomé.
Telephone: 21 34 81

Direction de l'Urbanisme et de l'Habitat, Ministère du Plan et de l'Industrie, Lomé.
Telephone: 21 35 95

Located on the Gulf of Guinea, Togo has a land area of 56,000km^2. One third of the population live in urban centres, including 13% in the capital Lomé.

Rainfall varies from 800mm in the north, to 1,300mm on the coast, giving adequate resources for Decade needs. Evaluation of resources is incomplete, made more difficult by the country's crystalline rock structure.

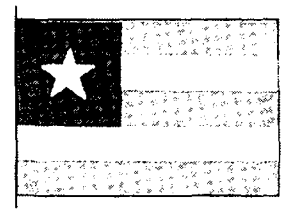
The smaller urban centres are supplied partly from groundwater and partly from surface sources requiring complete and costly treatment. Most of the rural population is supplied from traditional sources (shallow wells, ponds, rivers) of dubious quality and without guarantee of perennial supply. About 40% have access to a safe supply.

Lomé takes its water from the Continental Terminal aquifer underlying the town. Boreholes at Cacavelli produce 24,000m^3/day, which is close to the safe yield of this aquifer. However, in the whole sedimentary coastal basin, estimated resources of 170,000m^3/day exist.

In 1980, only 70% of the capital had house connections or access to a standpipe. The rest used polluted dug wells. All of Lomé now has safe water, 81% of it from standpipes.

A small part of central Lomé has a sewerage system, with only 311 connections. Another 30% of the town relies on septic tanks, but the municipality is not sufficiently equipped to dispose of sludge.

In the rural areas, 40% of the population has access to safe water, but only 9% has adequate sanitation.



Sector investment

Investments in rural and urban water supply have been stepped up, and it is planned to provide a water supply for the whole population by 1990, funded by, among others, EDF, UNDP, UNICEF, and USAID. This can only be achieved if international and bilateral assistance continues at the levels already established.

For sanitation, however, the financial and managerial constraints of the country cannot cope with this subsector in addition to the ambitious targets for drinking water supply.

In the first five years of the decade, $10.56M has been spent, 74% of it from external sources.

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
30-80	20	39	7

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	
Investment totals (US $ millions 81-85)	10.56

ACTUAL AND TARGET LEVELS OF COVERAGE							
Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 700	100	390	0	170	(1980) 1,800	565	180
(1985 Actual) 819	154	665	0	250	(1985) 2,249	918	209
(1990 Targets) 1,046	156	886	33	383	(1990) 2,568	2,552	2,054

UNIT COSTS OF WATER PRODUCTION (US$/m^3)		
Average cost	Operation average water tariff	Progressive water tariff
0.66	0.33	YES

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)					
Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
			142	23	

Tokelau

Currency: NZ dollar 1.88 = US$1.00
Population: 1,700
Population growth rate: 1.2%
GNP per capita: US$900
Life expectancy: N/A
Infant mortality per 1,000 births: N/A
Water diseases per 100,000: N/A
Adult literacy: 99%

WATER AND SANITATION AGENCIES

Tokelau General Feno (Assembly)

Tokelau Public Service for Implementation

Three atolls, Atafu, Nukunono and Fakaofo, are the main islands of the Tokelau Islands, which lie about 435km north of Western Samoa.

Although the inadequacy of water resources is a severe constraint on development, the 1,700 islanders all have reasonable access to safe water. However, the quality of water supplies is not routinely monitored.

About 700 people have adequate sanitation and community service workers are employed to support primary water and sanitation services as part of a health care effort.

The islanders have 99% literacy rate and primary school children receive regular instruction in health education. Population growth rate is 1.2%.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
-	-	-	-	31.5	25.5

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
	100		>50

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
212	N/A	NO

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
0	-	-	-	-	1.5	1.5	0.3
(1985 Actual)					(1985)		
0	-	-	-	-	1.7	1.7	0.6
(1990 Targets)					(1990)		
0	-	-	-	-	2.0	2.0	0.7

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	10

VRS PIPES FOR ITALY AND THE WORLD

3,000 KM OF PIPES AND 300,000 JOINTS IN SERVICE

The VRS pipe manufactured in Italy through an exclusive licence agreement with ARMCO INC. (U.S.A.) is the result of decades of study and research carried in fiberglass reinforced plastics (P.R.F.V.), validated by the positive experience of thousands of kilometers of pipe installed under wideley varying environment and service conditions, conducting a wide range of fluids.
Its most important specifications are:
resistance to corrosion and erosion, lightness, ease of installation, versatility for diverse application suchas acqueducts, irrigation, water and sewer systems, industrial waste, piping into the sea pipelines for hydroelectric power plants, supply and waste piping for thermoelectric and nuclear power plants, etc. The standard range of products includes diameters from 300 to 1200 mm., with pressure classes of 4.5-6 10-16 bar and more.
A primary consideration when selecting a material for piping is durability; VRS pipes are manufactured according to a durability centred technology. In facts VRS pipes are designed according to a safety factor applied to a 50 years period.

THE JOINT

This element, the importance of which is well known by designers, is one of the most important features of the VRS pipe.
The bell's internal diameter is perfectly made and constant in every point, within close-tolerance as it is manufactured on a rigid mandrel of high precision.
Also the spigot is made using a shaped and ground mold of special steel.
Therefore the compression on the elastomeric «O» ring gasket, confined in a groove that prevents movements, is constant within very narrow limits all along its circumpherence.
These caracteristics ensure a perfect thightness, confirmed by more than 300,000 joints in service without any inconvenience.
The VRS joint provides flexibility necessary for all normal service conditions, including pipe expansion and contraction, earth settlement, entering or leaving rigid structures, misalignement and forming curve radii.
The standard design of the VRS joint conforms to the Water and Power Resources Service parameters and it has passed the ASTM D-3262 jont test requirements.

FITTINGS AND SPECIALS

Tubi VRS offers a full line of fiberglass fittings according to ASTM D-3840 requirements or of steel fittings duly coated with resin inside and outside, according to the pressure classes.

STANDARDS

The VRS pipes are manufactured according to the following international standards UNI, ASTM, AWWA, ATV, BS.

The pipes meet the Italian Ministry of Health's requirements issued by Act n. 102 dated 2 December 1978.

TUBI V.R.S. spa

FIBERGLASS-RESIN-SILICA PIPES
PLANT OF BARI - ITALY

ACQUEDUCTS - IRRIGATION - SEWERS - PIPING INTO THE SEA

Tonga

Currency: Pa'anga 1.4 = US$1.00
Population: 99,500 (35% urban)
Official language: Tongan
Population growth rate: N/A
GNP per capita: US$354
Life expectancy: 60 years
Infant mortality per 1,000 births: 9.8
Water diseases per 100,000: 3,015
Adult literacy: 93%

WATER AND SANITATION AGENCIES

Ministry of Health,
Taufa'ahau Road, Tofoa, Tonga
Telephone: 21-200

Tonga Water Board,
Taufa'ahau Road, Nuku'alofa, Tonga
Telephone: 21-299

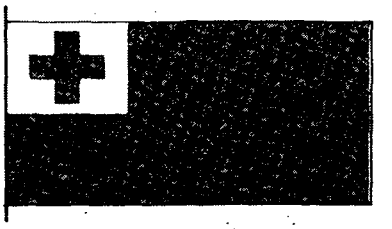
The only Polynesian kingdom, Tonga lies 2,000km north of New Zealand in the Pacific Ocean. It comprises 170 coral islands of which 36 are uninhabited. Total land area is 690km^2 and total population is just under 100,000.

As part of its commitment to the International Drinking Water Supply & Sanitation Decade, the government has initiated the National Sanitation Programme executed jointly with the World Health Organisation. The NSP provides technological physical resources for dealing with water supply and sanitation problems, while WHO provides a sanitary engineer as director. He has a staff of nine and resources to rectify water and sanitation problems.

The whole of Tonga has to be considered rural for water supply and sanitation purposes, even though some areas are legally defined as "urban". Attitudes and living conditions remain basically the same regardless of location.

Potable water is available to 95% of the Tongan population, with water systems including rainwater catchment and surface water development. These often do not reach WHO standards for chemical and bacteriological quality.

Sanitation in both rural and urban areas continues to be a much larger problem than water, due to dense population, topographic conditions and existing sanitation facilities and practice. Of particular concern are



densely settled swamps in urban areas and densely settled small sand atolls in the more remote areas.

All sanitation projects are implemented through community self-help groups, mostly pre-existing women's groups, but some implemented with NSP help. Financial control and contribution is made through these groups, usually by a participation process, partial finance developed in the community and community application for outside assistance. NSP helps to coordinate this.

All water projects operate on the same basis through village water committees which have been established.

All NSP projects include both passive and active educational programmes. They are also actively supervised by NSP during and after installation as a guarantee of long-term effectiveness.

Because of the size and demography of Tonga, all information systems regarding water supply and sanitation are coordinated through two agencies. The Ministry of Health's Public Health section coordinates all sanitation and rural community water supply schemes, while Tonga Water Board, chaired by the Minister of Health, coordinates the three major "urban" schemes.

NSP, under MOH/PH, has an integral monitoring system for all the sanitation projects it initiates, examining semi-annually the function and effectiveness of the projects. The Programme is in the process of computerising the projects on a unit registration process that will make storage, retrieval and extrapolation of parameters for evaluation a much easier task.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
28.6	25.3	-	-	28.0	69.2	48.4	28.0
(1985 Actual)					(1985)		
34.6	29.3	-	-	34.6	64.9	70.2	70
(1990 Targets)					(1990)		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
63	N/A	N/A	73	48	30

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
130	60	130	30

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.8	0.85	YES

Trinidad & Tobago

Currency: Dollar 3.6 = US$1.00
Population: 1,176,000 (68% urban)
Official language: English
Population growth rate: 1.6%
GNP per capita: US$6,020
Life expectancy: 67.4 years
Infant mortality per 1,000 births: 19
Water diseases per 100,000: N/A
Adult literacy (M/F): 97/95

UNDP resident representative: 19 Keate Street, PO Box 812, Port of Spain

WATER AND SANITATION AGENCIES

Ministry of Finance, Trinidad House, St Vincent Square, Port of Spain
Telex: 3450

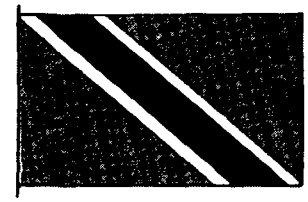
Ministry of Public Utilities, Port of Spain

Ministry of Health, Port of Spain

Water & Sewerage Authority, Port of Spain

The Caribbean islands of Trinidad and Tobago lie off the Venezuelan coast of South America, covering a combined land area of 5,128km^2. The two islands are, however, physically and economically distinct.

Geologically Trinidad belongs to the Paria peninsula on the Venezuelan coast, and like it has reserves of oil and gas. Tobago, 35km to the north, is volcanic in origin and, without oil, the poorer island. Creation of a Tobago House of Assembly in December 1986 appeased threats of secession.



Levels of service

In 1985, 84% of the urban population had house connections, and the remainder took water from standpipes. This was an improvement on the 1980 position, when 79% had house connections. Mains sewer provision in urban areas had also improved slightly, from 24% coverage to 26%, despite an increase in the urban population of 100,000. The remainder had other means of sanitary disposal.

In rural areas, it is estimated that 95% of the population of 376,000 have adequate water supply and sanitation.

Sector investments

Trinidad and Tobago is believed to have earned $29,000M from oil betweeen 1974 and 1985. Consequently, the country has been able to finance investment in the water supply and sanitation sectors internally. In the five years to 1982, $55M was spent annually on water supply and $10M on sanitation, representing together 4% of overall development expenditure.

However, infrastructure development failed to keep pace with growth, and frequent breakdowns in water supply were reported.

In 1982, oil prices began to slip, and the economy went into recession. Negotiations with the World Bank and the European Development Fund followed. The EDF is financing a rehabilitation and extension of the water supply system in Tobago, and in 1987 water resource studies were underway, also funded by the EDF.

In 1980, it was reported that major constraints to development in the water and sanitation sectors included inadequate cost recovery. The practice of using foreign consultants had also exacerbated the problem of lack of local skills.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
700	550	150	165	500	396	370	350
(1985 Actual)					(1985)		
800	672	128	212	588	376	358	358
(1990 Targets)					(1990)		
908	763	145	240	668	881	837	937

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
385	330	880	440	451	110

Tunisia

Currency: Dinar 0.82 = $1.00
Population: 7.34 million (53% urban)
Official language: French
Population growth rate: 2.5%
GNP per capita: $1,277
Life expectancy: 62 years
Infant mortality per 1,000 births: 60
Water diseases per 100,000: 60
Adult literacy (M/F): 68/41

UNDP resident representative: 61 Boulevard Bab Benat, BP 863, Tunis

WATER AND SANITATION AGENCIES

Direction de Resources en Eau et Sol, Ministère de l'Agriculture, 30 Rue Alain Savary, Tunis Tunisia
Telex: 13378 MINAGR

Société Nationale l'Assainissement (ONAS), 8 Rue Sénégal, 1002 Tunis, Tunisia
Telex: 12080 ONASTU
Telephone: 288 088

Société Nationale d'Exploitation et de Distribution des Eaux, (SONEDE), R. Jawaher Lanahrou, Tunis, Tunisia
Telex: 12262 SONEDE

Ministère de la Santé Publique, Tunis
Telex: 12235 SANTE

Ministère du Plan et des Finances, Tunis 13732 MINFIN

On the Mediterranean coast, between Libya and Algeria, Tunisia lies at the eastern end of the Atlas mountains which form a plateau, the Dorsale, extending to the Gulf of Tunis. Two rivers, the Medjerda and the Milyan flow from the Dorsale through alluvial lowlands where their water is used for extensive irrigation.

South of the Dorsale the land becomes Saharan and there are no perennial streams although damaging flash floods may follow rainfall. In some desert areas there is sufficient moisture for shifting cultivators to plant occasional crops.

Tunisia has a Mediterranean climate. There is a summer drought throughout the country and in most areas evaporation rates exceed total precipitation. The interior suffers from extremes and winter temperature may fall to freezing in the moutains while summer temperatures reach 49°C in the southern desert.

The Ministry of Agriculture Water and Soil Directorate has the main responsibility for water. The National Society for Exploitation and Distribution of Water (SONEDE) has technical responsibility for water supply to communities of more than 500 people but is answerable to the Ministry of Agriculture. The National Sanitation Office (ONAS) is in charge of urban sanitation, and the Ministry of Health looks after water quality and is involved in general planning in rural areas.

Decade targets are for private connections to 100% of the urban population by 1990 and for reasonable access to safe water for 30% of the rural population.

Many appropriate and simple technologies for rural water supply have been tried in the past 15 years. These include handpumps, foot pumps, rainwater storage and wind-powered pumps and the research programme involves investigating solar and wind energy and the treatment of sewage for reuse in agriculture.

Communities participate in planning rural water supplies and may participate to some extent in operation and maintenance. Local associations of consumers or institutions such as schools or dispensaries may also provide operation and maintenance facilities.

There is good coordination between SONEDE, ONAS and the Ministry of Health and a National Committee for Water and a National Commission for the Environment have been set up.

Each institution has developed a programme for in-service training, but lack of trained personnel remains one of the main constraints on the sector.

Insufficient finance is available to met the Decade target of access to safe water for all by 1990.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	N/A
Investment totals (US $ millions 81-85)	114

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
280	35	480	194	150	40

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 3,500	2,480	N/A	1,600	1,900	(1980) 2,800	470	N/A
(1985 Actual) 3,877	3,513	364	2,099	1,158	(1985) 3,464	1,090	552
(1990 Targets) 4,892	4,892	-	3,963		(1990) 3,262	1,370	N/A

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
	20	73	23

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
0.504	0.354	YES

Turkey

Currency: Lira 914 = US$1.00
Population: 50,200,000
Official language: Turkish
Population growth rate: N/A
GNP per capita: US$1,080
Life expectancy: 64 years
Infant mortality per 1,000 births: 84
Water diseases per 100,000: 33 (1980)
Adult literacy (M/F): 86/62

UNDP resident representative: PK407, Ankara

WATER AND SANITATION AGENCIES

Ministry of Health & Social Welfare, Ulus, Ankara
Telephone: 131 74 70
Telex: 42770 SSYB TR

Ministry of Agriculture, Forestry & Rural Works Müdafaa Caddesi, Yenisehir, Ankara
Telephone: 125 75 10
Telex: 42103 OGM TR

Istanbul Water & Sewerage Organisation (ISKI) Genel Müdürlügü, Istanbul

State Water Works (DSI) Anittepe, Ankara
Telephone: 341105

Ankara Water Works Ulus, Ankara
Telephone: 2451 90

The 781,000km^2 which Turkey covers comprises 26 catchments, four of which are inland drainage basins with no outlet to the sea. Annual rainfall ranges from less than 300mm inland to more than 3,000mm on the Black Sea shore.

Total water resources are estimated at 105km^3/year, more than 95% of it from surface sources. At the end of 1980 only 11% of this amount had been exploited. Some parts of the country have a surplus, and other areas are desperately short of water.

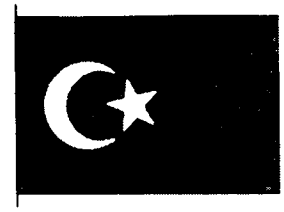
In 1980, 69% of the urban population was served by house connections, and another 25% had reasonable access to public standpipes. In rural areas, about 62% had access to a piped water supply. Public supplies, urban and rural, were generally not treated, and only occasionally chlorinated.

About 56% of the urban population had adequate sanitation in 1980, mostly by pit privvies and septic tanks. No figures were available for the level of sanitary provision in rural areas.

More recent data are not available, but it is likely the situation has improved because of a number of major supply and sewerage schemes planned for the Decade.

Responsible agencies

The State Planning Organisation was responsible in 1980 for sector strategy at national level. The State Water Works (Devlet Su Isleri) is a national water resources and development agency dealing with consumers and conservation. In 1980 DSI had 3,000 staff working on community water supply, of whom 160 were engineers and 75 technicians.



The Bank of the Provinces (Iller Bankasa) is an autonomous corporation in which municipalities are shareholders. About half of its work is assisting with the design and construction of water supply and sewerage systems - in 1980 it employed 290 engineers and 420 technicians on water supply and 130 engineers and 190 technicians on sewerage. Until the creation of the Istanbul Water & Sewerage Organisation (Istanbul Sular ve Kanalizasyon Idaresi), Iller Bankasa was the only agency responsible for municipal sewerage systems.

For the rural areas, the General Directorate for Roads, Water & Electricity in the Ministry of Rural Affairs & Cooperatives (Yol Su Electrik) is responsible. Municipalities and village councils are responsible for operation and maintenance of water supply and sewerage systems, but frequently lack personnel and finance.

The Ministry of Health and Social Welfare (formerly Social Assistance) undertakes epidemiological interventions.

Turks & Caicos Is

Currency: US $
Population: 8,700
Official language: English
Population growth rate: N/A
GDP per capita: US$ 3,000
Life expectancy: N/A
Infant mortality per 1,000 births: 32
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Chief Minister's Office,
Front Street,
Grand Turk,
Telex: 8227 CHIEFMIN TQ

Covering an area of 428km^2, the 30 small Turks & Caicos islands in the Caribbean Sea are a south-east continuation of the Bahamas. Climate is dry and half the population lives on Grand Turk.

Three of the six major inhabited islands, Grand Turk, Salt Cay and South Caicos (called the Salt Islands) have no drinkable groundwater resources while the other three islands - primarily rural - have limited groundwater supplies of fresh water lenses floating on the salt water beneath the ground.

The salt islands rely entirely on rainwater catchment while the other three make use of some wells. All new buildings are required to have sufficient storage capacity for roof catchment and thus become largely independent of the public water supply. Householders of existing dwellings are also encouraged to provide catchment systems and tanks. However, uncontrolled household storage tanks will represent a health hazard. Indeed, in 1985, 30.8% of the total population did not have safe water supplies.

Future projects to be considered include:

- Installation of transfer mains to link existing storage facilities on Grand Turk;
- Rainwater catchment with unassociated storage facilities using the Grand Turk runway;
- Exploratory drilling on Providenciales.

Other areas which need to be investigated include:

- Periodic water shortages in South Caicos;
- Likely future demand resulting from increased tourist development in Grand Turk and the Providenciales.

While statistics for the Water Decade to 1990 are unavailable, immediate country objectives include:

- Improving water distribution in Grand Turk;
- Making provision for water supply for at least one major hotel development in Grand Turk;
- Assessing groundwater resources in Providenciales;
- Improving unsatisfactory rainwater collection, storage and distribution systems in South Caicos;
- Reviewing water legislation.

With limited groundwater resources available, the government envisages that private rainwater catchment is likely to remain the main source of water with government tanks being held as reserves for sale.

Desalination would be the only practical alternative and this, the government has noted, would be expensive.

Tuvalu

Currency: Aust$1.36 = US$1.00
Population: 8,200 (37% urban)
Official language: English and Tuvaluan
Population growth rate: 1.3%
GNP per capita: US$386
Life expectancy: 59 years
Infant mortality per 1,000 births: 54
Water diseases per 100,000: 4,520
Adult literacy (M/F): N/A

WATER AND SANITATION AGENCIES

Ministry of Works & Communications, Funafuti

Health Division, Ministry of Social Service, Funafuti

Save The Children Federation, Funafuti

Nine coral atolls, lying no more than 5m above sea level, make up Tuvalu. Six of the islands enclose sizeable lagoons, but the other three are pinnacles rising steeply from the ocean floor. The total land area is just 26km^2, spread over half a million square kilometres of the Pacific. The climate is tropical, with an average annual rainfall of 3,708mm.

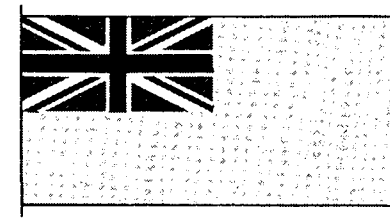
Funafuti is the capital island with a population of about 3,000. The outer islands are classified as rural with a combined population of 5,230. In 1980, population growth rate was 1.5%.

Water supply

Main source of water on all the islands is rainwater catchment. Water is stored in concrete cisterns, galvanised iron and fibreglass tanks, and 200 litre drums. In the capital, families have individual tanks; in rural areas communal systems operate, collecting water from public building roofs. Groundwater tapped by wells is mostly brackish and used for washing. Three islands have potable well water.

In 1980, communal storage facilities were inadequate, supplying only 2.25 litres/person/day. Now (1985) it is reported that 87% of the population has access to a potable water supply, but no figures are available on the quantity available. There is a continuing programme of building ferrocement water tanks on Tuvalu, as island with no roads, railways or telephones.

There is no public sewerage system. Each household has a pour-flush latrine and septic tank, but in 1980 233 households (3%) still had no toilet facilities.



National plans

A decade plan is said to be in preparation. However the existing programme of tank and latrine construction should allow the 1990 population of 9,000 people to have adequate water and sanitation facilities.

The Health Division of the Ministry of Social Services supervises construction of water-seal latrines. The Save The Children Federation constructs ferrocement tanks for individual households. Building of communal water cisterns is supervised by the Ministry of Works & Communications.

Each island has a development coordinator in charge of building water tanks, and a sanitation aide in charge of the latrine programme. Their work is supervised by the SCF director and the Health Inspector respectively.

In 1980, unit costs of construction were about US$85 for a 4.5m^3 water tank, and $10 for a water-seal latrine. Communities provide free labour and cement for the water tanks. Cement for latrine construction is provided by external funding agencies.

No formal health education is included in the primary school curriculum, but *Radio Tuvalu* has weekly broadcasts.

Uganda

Currency: Uganda Shilling 60.13 = US$1
Population: 16 million (13% urban)*
Official language: English
Population growth rate: 2.8%
GNP per capita: $230*
Life expectancy: 53 years
Infant mortality per 1000 births: 105*
Water diseases per 100,000: N/A
Adult literacy (M/F): 70/45

*UNICEF, 1985/6

UNDP resident representative:
IPS Building, Obote Avenue,
PO Box 7184 Kampala

WATER AND SANITATION AGENCIES

Ministry of Minerals and Water Development
PO Box 7096 Kampala
Telephone: 254855 and 231660

Lying to the North and West of Lake Victoria, Uganda is both landlocked and a "least developed" country. More than 80% of the land area is plateau between 900m and 1,500m above sea level. Land area is 236,000km^2. Rainfall is between 762mm and 1524mm on the plateau while areas in the south and northeast have less rainfall.

Uganda has only recently come out of a period of intense civil war and the present government is still dealing with insurgency in some regions. Thus plans set in train at the start of the Decade have had little opportunity to come to fruition, though there has been steady progress on urban water supply in some areas and a UNICEF backed programme to rehabilitate 5,000 boreholes drilled before 1970.

Rehabilitation has been a major part of the government's Decade planning, since Uganda's infrastructure had been highly developed before the years of turmoil.

Water supply

At the outset of the Decade most urban water systems were in a state of total collapse and the population without access to safe water in 1985 was still near 80%, among the highest in Africa. A Decade plan drawn up by a previous government in 1984 aimed to achieve 80% urban coverage by 1985, and 40% coverage in rural areas. In both cases this would require more than doubling existing provision.

Sanitation

The percentage of the population without access to adequate sanitation is just under 70%. The 1984 Decade plan envisaged 85% urban sanitation provision and 50% in the rural areas, a doubling of provision for rural dwellers and trebling existing urban supply.

The government has reported that it estimates that the cost of providing safe water and sanitation to urban dwellers will average US$210 and US$300 respectively but it does not break this down into different levels of service. The figures are on the high side for the region and suggest a large number of individual connections.

Cost of providing water in rural areas is estimated at US$40 per capita and rural sanitation US$25.

UNICEF Programme

UNICEF's programme involved rehabilitating 5,000 existing boreholes and fitting them with India Mark II pumps. At the same time a high speed drilling project is underway for providing new water sources. Both projects are now working well despite initial setbacks. In the first two years of the programme 3,000 pumps were serviced but were plagued by repeated breakdowns with lack of supplies a major factor.

In 1983 only a third of the pumps repaired were back in service. New handpumps had to be installed and the India Mark II - locally called the U-Two - was chosen. The programme was implemented by the Water Development Department (WDD) which introduced an incentive plan during 1983. By 1984 1,100 replacements had been completed, double the target figure. All 5,000 are scheduled for replacement by 1987 and no problem is expected with meeting this deadline.

Meanwhile the drilling programme envisages 5,000 more boreholes by 1990. Costs have been kept low by use of direct labour through the WDD. Average tender price for a borehole is in the region of US$10,000 while the WDD has been completing boreholes for US$3,333 per contract.

The boreholes will be maintained by community-based handpump maintenance workers with local bicycle repair people being recruited and trained in U-Two maintenance. Plans also exist to make the borehole the legal property of the community rather than the government.

United Arab Emirates

Currency: Dirham 3.67 = US$1.00
Population: 1.4 million *
Official language: Arabic
Population growth rate: N/A
GNP per capita: $19,270*
Life expectancy: 70 years*
Infant mortality per 1,000 live births: 35**
Water diseases per 100,000: N/A
Adult literacy (M/F): 58/38

*World Bank (1985)
**UNICEF (1985)

UNDP resident representative: Istiqlal Street, PO Box 3490, Abu Dhabi

WATER AND SANITATION AGENCIES

Ministry of Electricity & Water, PO Box 219, Abu Dhabi
Telex: 22369 WATER

Water Department Abu Dhabi and Al Ain, PO Box 219, Abu Dhabi
Telex: 22696 LEEWA

Ministry of Health, PO Box 848, Abu Dhabi
Telex: 23439 HEALTH

Ministry of Health, PO Box 1853, Dubai
Telex: 45678 SEHTAD

Ministry of Works: PO Box 878, Abu Dhabi
Telex: 23833 INPHW

Ministry of Public Works, PO Box 1828, Dubai
Telex: 47020

The United Arab Emirates consist of Abu Dhabi, Dubai and other smaller emirates covering a total area of 77,700km^2.

The country receives an average 1,290M.m^3 of rainfall annually, but only 14% of this recharges the area's underground resources, the rest being lost in evaporation or runoff to the sea. In recent years, however, the country has suffered a severe dry spell resulting in falling water tables, increased salinity and reduced farm yields.

The country is fortunate that its huge oil revenues have enabled it to use expensive water supply techniques unavailable to poorer nations. Thus, over 50% of the UAE's total annual water consumption of 1,060M.m^3 is supplied by desalination plants. A programme is also under way to construct eight dams across the country to conserve up to 100M.m^3 of water mainly for agricultural use. Five of these, impounding 20M.m^3 have already been constructed.

Abu Dhabi, the capital, is spending nearly $14M to drill a total of 56 wells to yield an extra 833,000m^3/d. Two storage tanks with a capacity of 3,800m^3 each are also being provided along with 45km of distribution pipelines.

At the start of the Decade, 967,000 people were living in urban areas, a figure estimated to increase to 1,378,000 by 1990. The target is for all of these to have private water connections by that time with sewer connections available to 85%.

The 113,000 rural population in 1980 is estimated to have decreased in 1990 to 78,000 of whom 74,000 will have reasonable access to safe water and all will have adequate sanitation systems, according to targets.

In 1983, per capita construction costs were estimated to be $100 for urban water via house connections and $30 through standpipes; $1,075 for urban sewerage and $430 for household systems such as septic tanks. Rural water supplies cost $85 per capita and rural sanitation $20. Average cost of water production was estimated to be $1.32/m^3 and the average tariff was $0.90/m^3.

United Kingdom

Currency: Pound sterling £0.62 = US$1.00
Official language: English
Population: 56.7 million (89% urban)
Population growth: 0.20%
GNP per capita: $8,460*
Life expectancy: 73 years
Infant mortality per 1,000 births: 12.00
Water disease per 100,000: -
Literacy rate (M/F): 99/99

WATER AND SANITATION AGENCIES

Department of the Environment, 2 Marsham St, London SW1P 3EB, England

Scottish Development Department, New St Andrew's House, St James Centre, Edinburgh EH1 3SX, Scotland

Welsh Office, Water & Environmental Protection Division, New Crown Buildings, Cathays Park, Cardiff CF1 3NQ, Wales

Department of the Environment for Northern Ireland, Water Service Headquarters, 3-5A Frederick Street, Belfast BT1 2NR, Northern Ireland

Each of the four countries of the United Kingdom has its own system of water and sanitation service, though England and Wales are usually considered together as both have adopted the system of integrated river basin management.

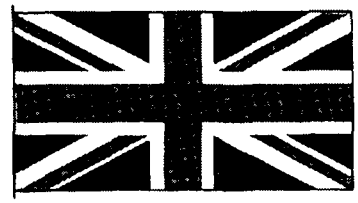
This system derives from the 1973 Water Act which created ten water authorities (nine for England and one for Wales) responsible for management of the entire water cycle.

The authorities' boundaries relate to river catchments and they are all responsible to the Secretary of State for the Environment. The regional water authorities are responsible for development of water resources, water supply, sewerage and sewage disposal, control of pollution, arterial drainage, sea defences and recreational use of waters.

This structure is unique and has been recognised as a model for other countries to follow. It is now, however, under threat from the Conservative government, re-elected in 1987, which intends to break up the system in pursuit of its policy of privatisation of public utilities.

The 1973 Act also left existing private water companies who discharge the water authorities' supply functions for about 25% of the population of England and Wales. Water for public potable supply is abstracted from rivers, reservoirs, lakes and groundwater and reaches 99.2% of the population. There are in addition some 80,000 private supplies of which only about 200 supply more than 500 people.

Generally, domestic supplies are not



metered, while industrial and some commercial supplies are metered. However, one result of the proposed privatisation of the water industry will be a considerable increase in domestic metering. In 1985/6, water authorities were estimated to have supplied 16,650Ml/d, which was forecast to rise to 17,000Ml/d in 1991/2.

In 1985/6, 83% of the population of England and Wales were served by sewage treatment works and 49.78M people out of 49.92M people were provided with a mains sewerage system.

Reorganisation of local government in Scotland in 1975 resulted in the functions of the previously established regional water supply boards being transferred to 12 regional or island councils, along with other services including sewerage and sewage disposal. One exception to this was the Central Scotland Water Development Board which serves the Strathclyde area around Glasgow.

At the same time, seven river purification boards were set up to maintain a pollution control function.

Responsibility for all water and sewage services in Northern Ireland lies with the Department of the Environment for Northern Ireland.

Uruguay

Currency: Peso 202 = US$1.00
Population: 3 million
Official language: Spanish
GNP per capita: US$1,650
Life expectancy: 72 years
Infant mortality per 1,000 births: 29
Adult literacy (M/F): 93/94
UNDP resident representative: Casilla de Correo 1207, Montevideo

With a land area of 176,000km^2 Uruguay is one of the smaller South American countries. Its population of 3 million is mainly urban (83% in 1980), half living in the capital Montevideo.

Climate is temperate, with a prolonged rainy season in July and August. Average rainfall is about 1,200mm in Montevideo, and about 1,500mm in the north. However, there are considerable fluctuations from year to year.

Numerous rivers flow through the country and are the main source of water supply. Groundwater resources are believed to be large, but currently barely exploited.

Levels of service

The most recent statistics available date from the 1975 census. Then, about 90% of the urban population had individual house connections, and another 7% had access to standpipes. Only 2.5% of the rural population was estimated to have a reliable and safe water supply.

Some 15% of the urban population had household sewerage connections, with 44% using septic tanks or pit latrines. About 60% of the rural population was considered to be adequately provided with sanitation facilities.

Decade plans

Although there was no formal Decade plan in 1980, it was hoped that an additional 175,000 urban dwellers would have private water connections by 1985, and 17,000 more would have been connected to mains sewerage. It is not known how far these targets have been reached.

It was calculated that $209M would have to be spent on water supply between 1980 and 1985, and $37M on sanitation. Average annual expenditure in the whole sector in the period 1976–1980 was only $11M, with $6.4M being spent in 1980.

In 1981, the Inter-American Development Bank approved a loan of $78M towards the $120M first stage of an urban sanitation project for Montevideo.

WATER AND SANITATION AGENCIES

Administration de las Obras Sanitarias del Estado, Soriano 1613, Montevideo

Secretaria de Planeamiento, Coordinacion y Difusion de la Presidencia de la Republica, Cnel Lorenzo Latorre 1366, Piso 4, Montevideo

Direccion Nacional de Aguas y Saniamiento Ambiental, 8 de Octubre 2995, Montevideo

Ministerio de Transporte y Obras Publicas, Rincon 561-8 Piso, Montevideo
Telephone: 906571/2/3

Vanuatu

Currency: Vatu 111.055 = US$1.00
Population: 137,000 (16% urban)
Official language: English/-French
Population growth rate: 1.85%
GNP per capita: US$529
Life expectancy: 56 years
Infant mortality per 1,000 births: 75
Water diseases per 100,000: N/A
Adult literacy (M/F): 57/48 (1979)

WATER AND SANITATION AGENCIES

Ministry of Transport, Communications & Public Works, PO Box 381, Port Vila.
Telephone: 2790
Telex: 1040 VANGOV NH

Public Works Department, PO Box 191, Port Vila
Telephone: 2888
Telex: 1040 VANGOV NH

Ministry of Lands, Energy & Rural Water Supply, PO Box 151, Port Vila
Telephone: 3105
Telex: 1040 VANGOV NH

Department of Geology, Mines & Rural Water Supply, GPO Port Vila
Telephone: 2213/2423
Telex: 1040 VANGOV NH

Ministry of Health, PO Box 102, Port Vila
Telephone: 2545
Telex: 1040 VANGOV NH

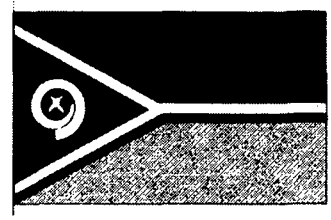
The South West Pacific country of Vanuatu consists of 80 small islands and has a total land area of 12,000km^2. The rural population are subsistence farmers and the main economic activity is agriculture.

Health programmes within the country have developed over recent years, but are still faced with a number of problems and constraints. Much of the problem lies in the poor transportation and communications system between the scattered islands. It is estimated that 80% of the prevalent disease in Vanuatu are preventable.

Vanuatu has adopted the principles of Primary Health Care and accordingly the government has shown great concern over the provision of safe water supplies and sanitation facilities. In the Vanuatu first Five-Year Development Plan specific targets aiming to cover as large a proportion of the rural population by the year 1990 were set.

The government decided to attempt to raise the sanitary standards over the country as a whole rather than implementing sanitation projects on an area-by-area basis. With the decentralisation which followed independence it is believed that this is a feasible proposition.

The progress in the sanitation sector was negligible for the period 1982-86, while progress in the water supply sector was very successful. The immediate objective of the National Decade Plan 2 therefore was to encourage the implementation of construction of sanitary



facilities of improved design in the rural areas to bring the sanitation facilities to the same level as water supply.

The specific targets of the Decade Plan are to build 14,600 latrines between 1987 and 1991. The rate of implementation of rural water supplies for 1985 reached over 12,000.

Constraints which have been identified include lack of coordination at central level which was mainly doe to the lack of a departmental head, and also insufficient staffing levels and funding for the sanitation sector which led to its poor record.

Some of these constraints have now been rectified through the appointment of staff at central level and the training of a number of village sanitarians for employment by Local Government Councils.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	14*
Investment totals (US $ millions 81-85)	5

*urban sector only

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
20	9	4.4	-	18.7	98	N/A	67
(1985 Actual)					(1985)		
22	12	9	-	19	115	62	29
(1990 Targets)					(1990)		
26	26	—	—	—	128	128	128

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	N/A	N/A	62	5

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
120	50	100	45

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.22	0.34	-

Venezuela

Currency: Bolivars 14.5 = $1
Population: 17.3M
Official language: Spanish
Population growth rate: 2.7%
GNP per capita: $3.080
Life expectancy: 70 years
infant mortality per 1,000 births: 45
Water diseases per 100,000: 4
Adult literacy (M/F): 88/85

UNDP resident representative: Apartado 69005, Caracas 106 2-A.

WATER AND SANITATION AGENCIES

INOS (Instituto National De Obras Sanitarias),
Avenida Andres Bello,
Edificio La Paz, P.B.,
Mezzanina,
Caracas 1050,
Venezuela
Telex: 51273 INOS VC
Telephone: 571 5054

Ministerio Del Ambiente y De Los Recursos Renovables,
Torre Sur,
Piso 18,
Centrol Simon Bolivar,
Caracas 1010,
Venezuela
Telex: 24434
Telephone: 408 1070

Ministerio De Sanidad y Asistencia Social,
Torre Sur,
Piso 5,
Centro Simon Bolivar,
Caracas 1010,
Venezuela
Telex: 21654
Telephone: 483 3533

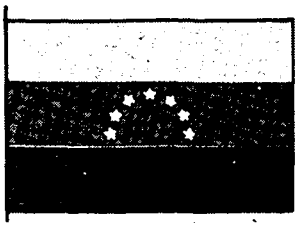
The Federal Republic of Venezuela, which has a tropical climate with temperate uplands, tropical forests and tall grass savannah lands, or *llanos*, is just north of the equator and is bounded in the west and north by the Andes and North Atlantic Ocean respectively.

Much of the country, which covers 916,445km^2, has abundant rainfall, the southwest between 600mm-2,500mm annually. The north has a more irregular rainfall between 400mm-1,320mm while the average for the south is 1,400mm, though some areas receive more than 4,000mm.

Currently exploited water resources are considered adequate to meet projected needs to the year 2000.

The percentage of the urban population served with house-hold connections for water supply at the end of 1980, the latest figures available, stood at 81.5%. An additional 1.2 million or 10% of the population had reasonable access to public standpipes. About half of the rural population of over 4 million was estimated to have access to safe water supplies.

In the field of sanitation, 60% of the urban population had household connections with an additional 30% served by household systems like septic tanks. Some 70% of the rural population had an adequate system of excreta disposal.



Targets have been established for the Decade and a detailed plan is under preparation. The government aims for 90% of the projected urban population of 17M to have household connections for water supply and for 75% to have individual sewerage connections. About 3% of urban dwellers will remain dependent on standpipes and 5% on an adequate non-mains sewerage system.

Rural targets are for 85% of the 1990 population to have access to safe water. In terms of rural sanitation, the Decade aims for 10% of the population to be adequately provided for.

In recent years, efforts have been concentrated on the urban poor which is estimated to be 47% of the population. During 1980, investment benefitting this group was 70% of the total investment and about a third of those designated as urban poor were given access to water and sewerage.

Major constraints include inadequate cost recovery and a lack of trained personnel.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) 12,029	9,804	1,200	7,217	3,607	(1980) 4,019	2,010	2,814
(1985 Actual) 14,169	N/A	N/A	N/A	N/A	(1985) 3,147	81.65	1.36
(1990 Targets) 16,575	N/A	N/A	N/A	N/A	(1990) 3,159	1,115	690

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	N/A	N/A	1,350	N/A

Vietnam

Currency: Dong 80 = US$1.00
Population: 61,700,000 (19% urban)
Official language: Vietnamese
Population growth rate: 2.3%
GNP per capita: N/A
Life expectancy: 60 years
Infant mortality per 1,000 births: 72
Water diseases per 100,000: 956 (1980)
Adult literacy (M/F): 91/78

UNDP resident representative: GPO Box 618, Bangkok, Thailand

WATER AND SANITATION AGENCIES

Ministry of Planning

Ministry of Construction

Ministry of Health

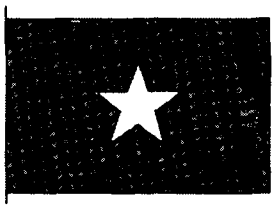
The 331,688km^2 land area of Vietnam supports a population variously estimated at between 59.7 million and 61.7 million, 81% of whom live in rural regions. Around two-thirds of the urban population live in three cities: Hanoi, Haiphong and Ho Chi Minh City.

In rural areas 39.3% of the population had reasonable access to safe water in 1985, an improvement on 1980 when the figure was 32%. About 70% of urban population had an adequate water supply (the 1980 figure is not available for comparison).

Sanitation facilities were available for 30 million people (71%) in rural areas in 1980. Although 2 million more people were served in the next three years, construction did not quite keep pace with population growth, and 70% of the 57.4 million rural population had adequate sanitation in 1983.

No data are available for present or historic levels of sanitation in urban areas. However, the government estimates that, by 1990, 60% of the predicted 13.2 million urban population will have sanitary facilities, half with sewer connections and half with household systems.

For urban water supply, the 1990 target is 30% with private connections, and 50% served by public standpipes, an improvement of 10% on the 1985 level of service.



Sectoral

The Ministry of Planning is responsible for national policy in the sector. However, in 1980, absence of planning and design criteria was listed as a very serious constraint.

Execution of urban projects is the responsibility of the Ministry of Construction in conjunction with Peoples' Committees. Rural projects and water quality control everywhere are handled by the Ministry of Health.

According to WHO, the health service has progressed steadily despite 30 years of war and intervention. In 1980 the Ministry of Health's objectives were trench latrines meeting hygiene requirements for every rural family and medical visits three times a year for everyone.

Western Samoa

Currency: Tala 2.136 = US$1.00
Population: 3,343,000 (25% urban)
Official language: English
Population growth rate: 2.30%
GNP per capita: $660
Life expectancy: 64 years
Infant mortality per 1,000 births: 29
Water diseases per 100,000: N/A
Adult literacy (M/F): N/A

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WATER AND SANITATION AGENCIES:

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Telex: 0779277 SX

Public Works Department, Apia
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Telex: 0779256 SX

Embassy of the People's Republic of China, Private Mail Bag, Apia
Telephone: 22474
Telex: 0779232 CHINA EMP SX

World Health Organisation, Ioane Viliamu Building, Apia
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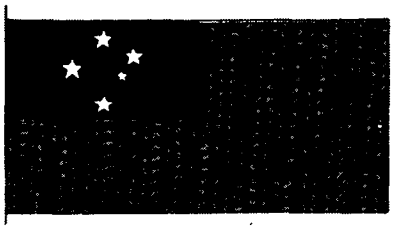
With a land area of 2,934km^2, Western Samoa consists of two large islands and several small ones. The climate is tropical with more than 2,500 hours of sunshine every year. The south and southeast windward areas receive between 5,000mm and 7,000mm/year of rain. Average rainfall on Apia, the main town, is 3,000mm/year.

Western Samoa has never suffered a water shortage, but the water is not all sufficiently safe for human consumption. About 40% of the rural areas have piped supply. The remaining 60% obtain water from various sources: springs; boreholes; wells; rivers and rainfall. The town of Apia has the only rated water supply; the rural areas arrange their own maintenance and finance.

The town area receives its water supply from river sources, which are collected in two reservoirs, and water is distributed to households by pipelines. Great efforts have been put into sanitation with disposal of human and solid wastes given the highest priorities.

There is no standard information system to relay information from district to central level, but close collaboration between the communities and health workers enables information to be updated. The Health Inspectors and District Nurses form the closest link between the Health Department and the villagers. The Public Works Department has done little to cooperate with the



Health Department in achieving the same goals.

UNICEF has recently granted US$120,000 for the production of water ferro-cement tanks and sanitation. Funds have also come from the International Labour Organisation for improvements to springs around the country. The two projects are coordinated by the Health Department with assistance from WHO in consulting with the respective organisations.

Very little has been done in planning programmes prior to their implementation. The main breakdown in communications occurs through a lack of cooperation between the different government agencies involved.

An information system for rural water supply and sanitation is essential to overcome inadequate relevant information problems existing within the country. Such an information system will enable assessment of the impact of programmes being implemented and will also aid the assessment of the community response to the projects.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
320.00	—	—	120.00	180.00	70.00

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
220	200	350	300

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
0.09	0.03	NO

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)	N/A				(1980)	N/A	
(1985 Actual)					(1985)		
40	30	—	—	35	120	80	100
(1990 Targets)					(1990)		
45	40	—	—	36	125	100	110

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	22
Investment totals (US $ millions 81-85)	4

Yemen Arab Republic

Currency: Yemen Riyals 9.5 = US$1.00
Population: 9.28 million (10% urban)
Official language: Arabic
Population growth rate: 2.55%
GNP per capita: US$471
Life expectancy: 42 years
Infant mortality per 1,000 births: 173
Water diseases per 100,000: 3,784
Adult literacy (M/F): 27/3

UNDP resident representative: Al-Haj Hassan Kassim Al-Wusta Building 202 Zubeiry Street, PO Box 551, Sana'a, Yemen Arab Republic

WATER AND SANITATION AGENCIES

Ministry of Public Works, Rural Water Supply Department, Sana'a
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National Water & Sewerage Authority, PO Box 104, Sana'a
Telex: 2174

Central Planning Organisation, 26 September St, Sana'a
Telex: 2266 CENPLAN

Located on the Southwestern corner of the Arabian peninsula, the Yemen Arab Republic faces the Red Sea to the West and extends into the Ar-rub al-Khali (Empty Quarter) desert to the east. It has a northerly border with Saudi Arabia and covers a total land area of 200,000km^2.

The country is divided into three topographical zones; the Coastal Plain, the Central Highlands and the Eastern Lowlands, and has the highest altitudes of the Arabian peninsula with some peaks exceeding 3,000m.

The Coastal Plain extends for about 400km along the Red Sea and for 60-80km inland. Maximum temperatures here reach 45°C in summer, and there is very little rainfall. Relative humidity varies from 60 to 80% throughout the year. Occasional spate irrigation is possible.

Sana'a, the capital city, and Taiz, the second most important city, are located in the Central Highlands where the climate is temperate and humidity relatively low. During winter temperatures in the highlands may drop to -4°C. The annual average is 21°C, and, even during summer months, 32°C is rarely surpassed. Annual average rainfall is 500mm, although 1,000mm falls on the exposed slopes of Ibb city.

The Eastern Lowlands are almost a desert and extend into the Ar-rub al-Khali, one of the most desolate parts of the world.

Most streams in the Yemen are seasonal, although the main *wadis* become perennial for a stretch before entering the Coastal Plain. Very little surface flow reaches the Red Sea or the Indian Ocean as most of the runoff infiltrates rapidly into alluvial aquifers adjacent to and underneath the streams.

Terraced areas in the highlands retain some of the runoff which follows rainstorms, but unterraced steep slopes offer little opportunity for infiltration. Most of the runoff comes from the south- and west-facing slopes in the western and southern escarpment. In the plain of Tihama, rivers are diverted for irrigation.

The government gives high priority to the development of safe drinking water supplies and considerable progress has been made under the first and second national Five-Year Plans.

About 87% of the total population of the country live in rural areas, where the Rural Water Supply Department of the Ministry of Public Works is responsible for design and construction of water supply systems. The Department, which was established in 1972, benefits from substantial technical support from the World Health Organisation and other international and bilateral agencies and it is expected that WHO technical support will be maintained throughout the Decade.

Difficult access to sites and the location of many villages on high mountain ridges means that unit costs are high. In addition, the conditions of service for staff are unattractive when compared with the private sector.

Despite these difficulties, the Department has been successful in planning and constructing rural water supplies and 161 projects, benefitting about 450,000 people were completed between 1981-84.

The Drilling Department of the Confederation of Yemen Development Association is also involved in borehole drilling in rural areas and completed 226 projects in the same period. The average depth of these wells is about 200m and the average cost including casing and screens is 1,200-1,500 Yemen Riyals.

In urban areas, which include Sana'a, Taiz, Hodeidah, Ibb and Dhamar, with a total population of 700,000, the National Water Supply & Sewerage Authority is responsible for providing drinking water and sewerage.

Within the 1981-85 period, NWSA constructed Stage Two of the Sana'a Drinking Water Supply Project, which involved 10 deep wells in the north-eastern part of the Sana'a basin. It is planned that the population of the capital will have between 12-150 litres/head/day, while current supply is about 80 litres.

Projects for Taiz and Al Hodeidah

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
710	355	355	71	355	5,517	993	N/A
(1985 Actual)					(1985)		
914	465	664	292	465	8,360	2,059	N/A
(1990 Targets)					(1990)		
1,295	900	395	540	755	9,154	4,577	N/A

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	1,055
Investment totals (US $ millions 81-85)	352.5

Yemen Arab Republic (cont)

were built before 1981, but new borehole schemes for Dhamar and Ibb have also been completed during the first half of the Decade.

A discrepancy of 40% between planned and actual water production between 1981-85 was caused by declining yields in Sana'a, where the groundwater table dropped due to the large number of deep wells which had been drilled; and by loss during distribution in Taiz, where about 50% of the water produced by new wells was lost during distribution through old, leaking water mains.

Efforts to improve the country's water supplies have resulted in 60% of the urban population and 20% of the rural population having reasonable access to safe drinking water supply. The main constraints hampering sector development are:

- severe shortage of trained and experienced Yemeni staff at both professional and technical level;
- lack of a water resources data base;
- absence of defined rural sanitation programmes;
- the fragmented nature of sector responsibilities;
- the lack of long-term training programme on a national scale within the Water Supply and Sanitation Sector.

More national effort and substantial foreign assistance is needed to meet the government's Decade goals.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
400	325	530	400	170	160

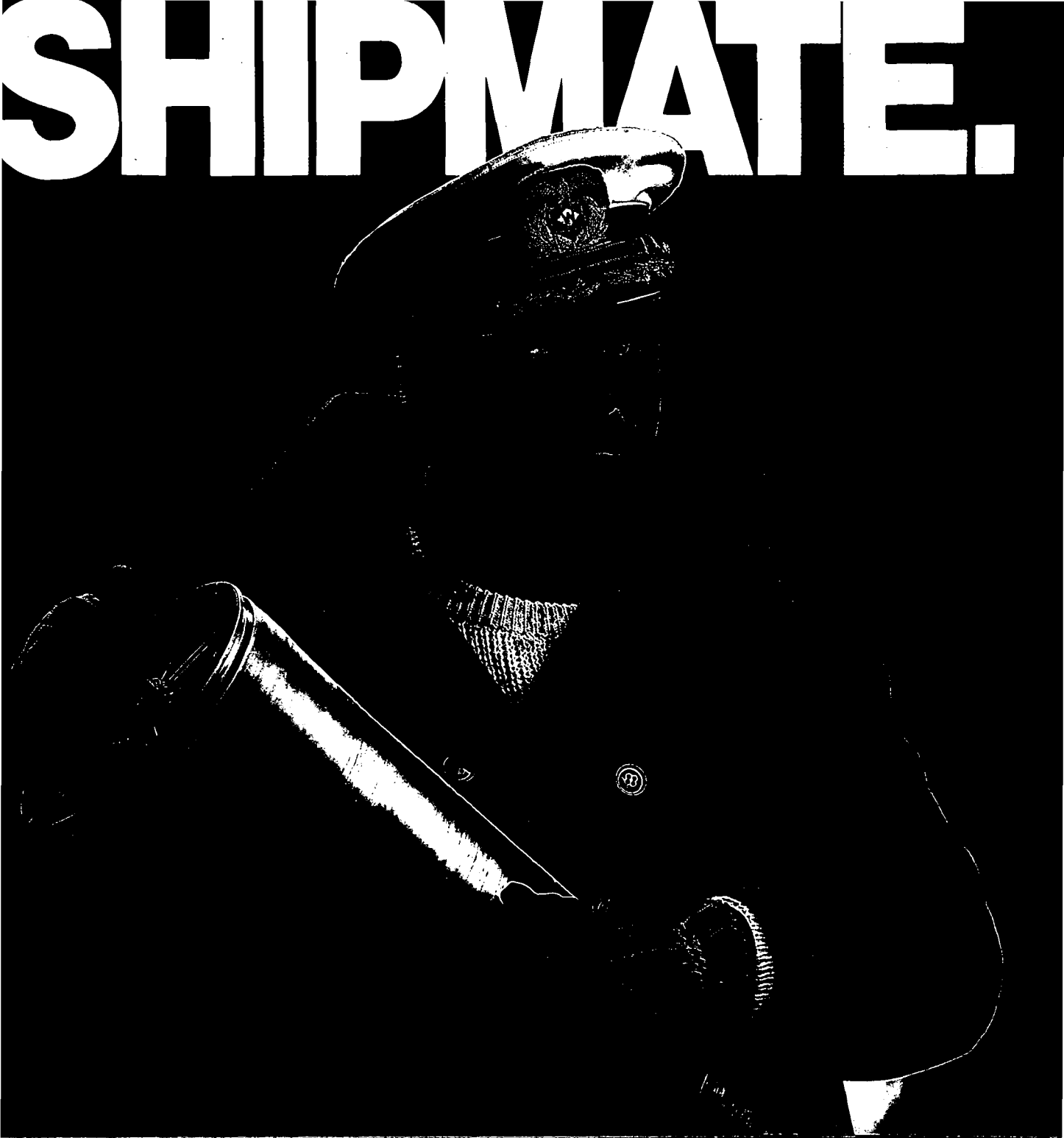
WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
60	40	60	40

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
N/A	1.16	YES

SHIPMATE.



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Yemen, PDR

Currency: Dinar 0.343 = US$1.00
Population: 2.1 million* (33% urban)
Official language: Arabic
Population growth rate: 2.6% (1983)
GNP per capita: $530*
Life expectancy: 46 years*
Infant mortality per 1,000 births: 128**
Water diseases per 100,000: N/A
Adult literacy (M/F): 59/25

*World Bank (1985)
**UNICEF (1985)

UNDP resident representatives: Miswat Street, PO Box 1188, Tawahi, Aden

WATER AND SANITATION AGENCIES

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PO Box 4004, Crater, Aden
Telex: 500 MEYAH

Ministry of Planning,
Tawahi; Aden
Telex: 2289 TAKHEET

Ministry of Agriculture
(Irrigation Administration),
Khormakser, Aden
Telex: 2292 ADF

Ministry of Agriculture (Drilling Corporation),
Khormakser, Aden

Total area of the People's Democratic Republic of Yemen is 338,100km^2 with a coastline over 1,100km long.

In 1983, the population was 2.06 million, of whom 33% were urban dwellers, 57% rural and 10% nomads. Life expectancy at birth was then 45 years for males and 48 for females.

The country is semi-arid with sparse vegetation. The northern part is mountainous with elevations of over 2,000m, a high plateau and a northern desert. The potential cultivable area is less than 1% of the total.

The climate is strongly influenced by the Asian monsoon winds. Average annual rainfall is about 300mm on the high plateau and 40mm in the coastal areas. Mean daily temperature ranges between 15°C and 38°C. Minimum temperature is around 4°C and maximum 48°C. Evaporation gauged by a Penman evaporation pan is between 2.5 and 4 metres per year.

The economic development of the country is organised in five-year plans. The present plan covers the period 1986-90.

Major points of government policy in the water sector are:

- Countrywide development of water resources:
- Improvement of the existing water supply system and increasing the efficiency of water utilities by reducing losses and wastage;
- Water supply projects serving the areas experiencing severe shortage particularly those in provincial areas with special consideration to be given to social objectives;
- Wastewater disposal projects to be launched in locations where health hazards are the greatest, for example in areas with high population density.

There is a very high backlog in project implementation due to shortage of money. A large number of project studies in urban and rural areas have been prepared and the government is looking for external assistance. For a total outlay of $303M between 1981 and 1990, the following internal and external resources are required:

Internal	*External*
(millions of US$)	
Urban water supply & sanitation	
84	172
Rural water supply & sanitation	
18	29
Total 102	201

The water supply and sanitation sector's share of the 1981-85 Five-Year Plan was $102M or 7% of total development outlay. During the first three years, a total investment of $65.4M was made for water and sanitation projects. Of this, $35.3M went towards Aden's water supply and sewerage; $21.3M went to selected urban areas; and $8.8M were allocated for rural water supply and sanitation systems.

A total population of nearly 980,000 have been served with water supply facilities, including 592,200 in urban areas and 387,300 in rural areas. Similarly, sanitation facilities have been provided for 773,600, including 503,200 in urban areas and 270,400 in rural areas.

Water supplies in urban centres and rural areas are adequately drawn from groundwater sources via shallow dug wells or boreholes. Estimated per-capita consumption varies from 45 to 122 litres per day, with the unaccounted-for water component reaching 31% in some schemes.

The Public Water Corporation was established in 1970 as a self-financing administrative public corporation charged with the duty of developing management and supervising the potable water supplies throughout the country. Several branches have been set up and expanded for the piped water supply provided under the National Development Plan. Other major water supply schemes are implemented under the supervision of PWC, which also gives technical advice and designs for community water supply systems.

The Ministry of Local Government undertakes overall responsibility for sewerage and sanitation programmes as well as small water projects in the northern desert areas. A small number of water supply and sanitation projects in rural areas are constructed and operated by local cooperatives and companies which come under the control of local authorities.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)					(1980)		
637	509	30	318.5	127.4	1,288	316	193
(1985 Actual)					(1985)		
		N/A				N/A	
(1990 Targets)					(1990)		
831	710	80	712.8	181	1,394	552	632

Yugoslavia

Currency: Dinar 557.30 = US$1.00
Population: 23,150,000 (46% urban)
Official language: Serbo-Croat
Population growth rate: N/A
GNP per capita: US$2,070*
Life expectancy: 72 years*
Infant mortality per 1,000 births: 23**
Adult literacy (M/F): 97/86

*WB Development Report
**UNICEF

UNDP resident representative: Svetoraza Markovica 58, PO Box 644, 11001 Belgrade, Yugoslavia

WATER AND SANITATION AGENCIES

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Jaroslav Cerni (Institute for Waterworks), Jaroslava Cernija 80, 11000 Belgrade, Yugoslavia
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Cable: Hidroinstitut

Approximately 70% of Yugoslavia is more than 200m above sea level. The lowlands cover the region along the river Danube and its tributaries, where about 70% of the population live. Danube water is used both for drinking water and for irrigation.

Available water per inhabitant from Yugoslavia's 1,800 rivers and 220 lakes is about 6,100m^3/year, plus another 5,500m^3 that flows in from outside the country, principally via the Danube basin. However, water resources are distributed very unevenly and are often polluted. For instance, though 20 out of 26 of the country's largest cities are situated on rivers, only seven are able to use the water after purification by classical methods and disinfection.

According to estimates, about 170m^3/s of drinking water is used by the population or about 200 litres/day per inhabitant (ranging from 5 to 500 lpcd). Their supplies come from public water supply systems, both regional and communal, small rural systems and individual intakes. The percentage connected to public supplies has risen from 40% in 1965 to 65% in 1980 with a predicted 86% by the year 2000.

However, this rapid development has not met the needs of the population. In 1981, 67% of the population was connected to a public water supply and the specific daily consumption of 182 litres per inhabitant was well below the consumption in developed countries. Occasional water shortages in large cities and tourist resorts necessitates more intensive development of new sources and protection of old ones.

Decade plans

Following the Mar del Plata conference, which initiated the Water Decade, the government formulated a programme of action and made recommendations to all executive councils of the republics and autonomous provinces to develop concrete plans and programmes to improve drinking water supply. Such programmes have been developed and are successfully implemented in the Socialist Republics of Macedonia and Bosnia & Herzegovina, and in other federal units.

A report by the Federal Institute for Statistics in water supply and sanitation in dwellings in 1981 showed sharp differences in the situations in different areas. In Bosnia & Herzogovina, for instance, less than 60% of dwellings had a piped water supply and less than 50% had adequate waste disposal facilities. In Slovenia, on the other hand, the respective figures for dwellings were 91.7% and 85.7%.

These differences have resulted from inequalities in economic development and the way rural settlements are densely located in the north and northwest but scattered in other parts of the country, and therefore harder to serve.

All data show a slowing-down in the construction of water supply and waste disposal systems in Yugoslavia in spite of increased investment. This is attributed to decreased non-economy investments in the country, as well as increased costs which have led to a reduction in the physical volume of investments.

By the end of the IDWSSD, only 82% of the population will be provided with drinking water from the public supply.

Sector responsibilities

In accordance with the self-management regulation of social affairs, self-management communities of interest for water management have been established in Yugoslavia. Within this framework, relationships between consumers of water and suppliers are established and water development policy determined and adopted. These communities are also responsible for establishing the standards for conservation of waterways and maintenance of facilities, pricing, resource pooling, construction of new facilities and control of selective use of resources. The assembly, which is the highest organ of self-management community of interest, is made up of delegates and delegations of workers, working people and citizens - the consumers.

Operational tasks, including programmes and plans for the protection and use of waters, execution of works on protection etc, are carried out by water management organisations. Recently, communes, work associations and other organisations have tended to set up Water Protection Communities to protect specific rivers and lakes, for example the rivers Sava and Una.

Specific republic and provincial programmes are developed to get supply systems developed more quickly. These are based on minimum support in terms of resources and maximum technical and methodological support. Funds are allocated on the basis of open bidding with priority given to projects that are more cost-effective, ie those that would provide drinking water to a larger population with the same amount of resources and which are justified in terms of epidemiological indications.

Some systems are developed with support from the international community, for example from the World Health Organisation and UN Development Programme (Kosovo and Spreča) and UNICEF (Sarajevo).

The construction of larger regional water supply systems has been increasing and a growing public concern is manifested in more frequent voluntary contributions made by citizens for the construction of water supply and waste disposal systems for example, in Belgrade.

Zaire

Currency: Zaire 94.2 = US$1
Population: 30.5M (38% urban)
Official language:
Population growth rate: 2.7%
GNP per capita: US$271
Life expectancy: 50 years
Infant mortality per 1,000 births: 103
Adult literacy (M/F): 79/45

UNDP resident representative:
Bâtiment de la Deuxième République, Boulevard du 30 juin, BP 7248 Kinshasa.

WATER AND SANITATION AGENCIES

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Telex: 21077/21325 REGIDO
Telephone: 22792, 25906

Service National d'Hydraulique Rurale, BP 15096, Kinshasa I.

Comité National d'Action de l'Eau et de l'Assainissement, Address as REGIDESO.

Programme National d'Assainissement, BP 12348, Kinshasa I.
Telephone: 77691

A vast equatorial country with a total land area of 2,318,951km², Zaire is rich in minerals. The main exports are copper, industrial diamonds, and coffee. Most of the north and central area is tropical rainforest, while extensive grasslands are found in the south.

A striking geographic feature is the great Zaire (Congo) river system, fed by an extensive network of tributaries. Annual rainfall averages 1,523mm and there are two rainy seasons. There is great hydroelectric power potential.

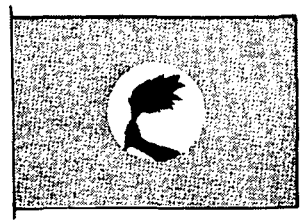
The urban population has grown rapidly, increasing by a third between 1980 and 1985 at the expense of the countryside where the population fell by 8%. It is expected that by 1990 39% of the population will be urban.

Decade progress

Water supply in towns has improved since 1980, in spite of rapid population growth. Urban water supply is provided by the Régie de Distribution d'Eau, a well developed institution with human, technical, and financial resources. In 1982, 40% of townspeople were estimated to have access to safe water, the rest using polluted wells or streams. Coverage now is 52%.

There are no figures for urban sanitation, and it is presumed that the situation has changed little since 1980, when sanitation was non-existent. It is hoped to provide 40% of the towns with non-sewered sanitation by 1990.

However, the main thrust of decade activity has been in the rural sector, where it was estimated that less than 5% of the population had potable water at the beginning of the decade. To address the disparity, a new organisation, the Service National d'Hydraulique Rurale



(SNHR), was created in September 1983.

SNHR's aim is to supply 35% of the rural population by 1990, and 50% by 1991.

Using appropriate technology, SNHR works through village committees from the planning to the building stage, and expects the village to finance the works within its own resources if possible. By 1984, SNHR had protected 800 rural sources, fitted 180 handpumps, and built 23 distribution systems, serving 800,000 people. In 1985 21% of the rural population has safe water, and nearly 10% some form of sanitation. SNHR also undertakes preventive measures to control water related diseases, which were said to be widespread amongst the rural population and urban poor in 1980.

Investment needs

REGIDESO planned a 150 million programme between 1982 and 1985, but was only able to finance about 20% of it. In the event 45 million was spent in the first five years of the decade throughout the sector, representing only 8% of the estimated 573 million cost of meeting decade targets.

There is considerable technical and managerial expertise in the water sector, with about 1,500 qualified or senior personnel, but very few in sanitation.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual)	N/A				(1980)	N/A	
(1985 Actual)					(1985)		
11,600	5,000	1,000	N/A	N/A	18,900	4,000	1,750
(1990 Targets)					(1990)		
13,500	8,000	1,500	N/A	5,400	21,400	7,500	7,500

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS

Estimated cost to reach decade targets (US $ millions)	572.6
Investment totals (US $ millions 81-85)	45.5

WATER CONSUMPTION l/c/d

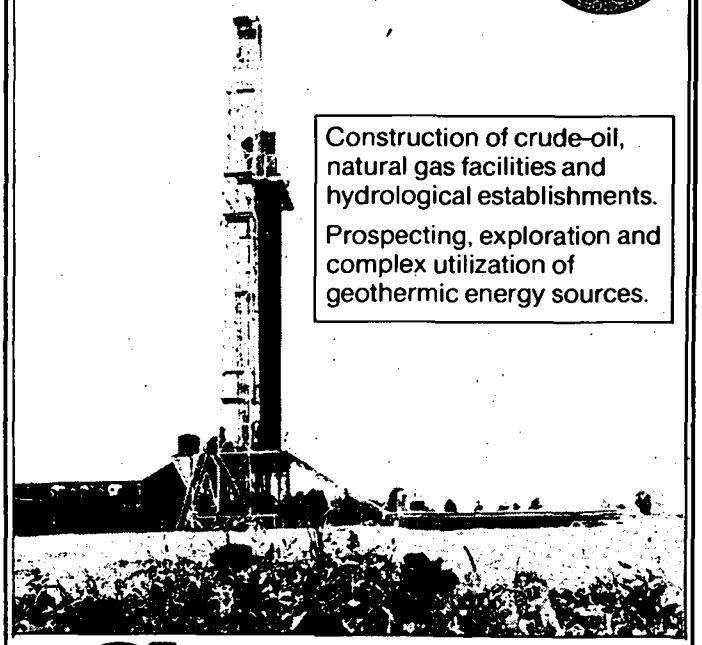
For design		Actual	
Urban	Rural	Urban	Rural
50	30	55	7

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
41	38	N/A	N/A	8	3

UNIT COSTS OF WATER PRODUCTION (US$/m³)

Average cost	Operation average water tariff	Progressive water tariff
0.22	0.27	YES



Zambia

Currency: Kwacha 8.06 = US$1
Population: 6.72M (48% urban)
Official language: English
Population growth rate: 3.3%
GNP per capita: US$390
Life expectancy: 51.4 years
Infant mortality per 1000 births: 105
Water disease per 100,000: N/A
Adult literacy (M/F): 84/67

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WATER AND SANITATION AGENCIES

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The National Action Committee for IDWSSD,
Department of Water Affairs, PO Box 50288, Lusaka
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Telex: 40830

Ministry of Health,
Director of Medical Services, PO Box 30205, Lusaka
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The Permanent Secretary, Ministry of Decentralisation,
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Ministry of Finance and Development Planning,
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The land-locked low-income developing country of Zambia has an area of 752,614km^2. For the past few years the government has been implementing a rigorous International Monetary Fund economic reform programme which failed to lift the economy out of ever-deepening crisis. In May 1987 the government announced that it was no longer able to pay its rising debt service and would therefore be limiting repayments to 10% of export income after paying for essential imports such as oil and fertiliser. This break with the IMF will have consequences for the government's ability to raise new loans though it has appealed to donor countries to continue to provide funds for Zambia's development programme.

In 1985 about 42% of the total population of 6,720,000 was without access to clean water, while 46% was without adequate sanitation.

Water supply

The government reported in 1985 that 1,424,000 of urban dwellers or 42% were supplied with drinking water by house connections while 1,044,000 or 32% were supplied by public standpipe - a total of 76% of all urban dwellers. To meet a growing urban population the government aims to provide house connections for an additional 800,000 people and standpipes for a further 300,000 by 1990, supplying 3,604,000 or 86% of the 1990 population.

The percentage of the rural population supplied with access to clean drinking water in 1985 was 41% or 1,441,000. This will be increased to 2,171,000 or 65% by 1990.

Sanitation

The percentage of urban dwellers supplied with adequate sanitation was 76% - of which 25% or 814,000 were served by connection to sewers and 51% or 1,654,000 by other means. It is planned to supply the growing urban population with sewer connections and the number of people served by these will be increased to 1,948,000 by 1990. The number of people relying on other methods is planned to remain more or less static. By 1990 3,604,000 or 86% of urban dwellers will have adequate sanitation.

About 1,166,000 people or 34% of the rural population were reported to have adequate sanitation. The number of rural dwellers provided with adequate sanitation will be increased to 2,000,000 or 60%, by 1990.

Decade targets

Zambia drew up Decade plans in 1983 and updated them in 1985. Current aims are to provide 85% coverage for urban water supply (53% by house connection and 32% by standpost) and 85% sanitation coverage (46% sewer connection and 39% by other means). Targets for rural water supply are 65% coverage and for rural sanitation 60% coverage.

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual)					(1985)		
3,243	1,424	1,044	814	1,654	3,477	1,441	1,166
(1990 Targets)					(1990)		
4,215	2,252	1,352	1,948	1,656	3,317	2,171	2,000

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
204-565	90	314-403	163	90	45

Zambia (cont)

Zambia's plans are determined by its large and growing urban population - currently 48% of the total but expected to grow from the 1985 figure of 3,243,000 to 4,215,000 by 1990. A slight reduction in population (from 3,477,000 to 3,317,000) is expected in rural areas.

COST ESTIMATIONS FOR DECADE TARGETS AND INVESTMENT TOTALS	
Estimated cost to reach decade targets (US $ millions)	840
Investment totals (US $ millions 81-85)	78

WATER CONSUMPTION l/c/d			
For design		Actual	
Urban	Rural	Urban	Rural
250-300	30	310	30

UNIT COSTS OF WATER PRODUCTION (US$/m³)		
Average cost	Operation average water tariff	Progressive water tariff
1.05	0.30	IN SOME AREAS

Decade requirements

The government reports that it will require 237 additional technical staff and 231 craftsmen by 1990. It has established a training budget to meet Decade requirements but believes this may be insufficient.

Per capita costs of construction are US$204-565 for house connections (high for the region) and US$90 for standposts. Urban sanitation costs range from US$314 to US$403 for sewer connections and US$163 for other methods. The per capita cost of rural water supply is US$90 while rural sanitation costs US$45.

Estimated cost of achieving Decade targets is US$840M compared with a total sector investment for the five years to 1985 of US$78M, which represented 6% of total development investment during the same period. Almost 80% of this was covered by external finance.

Zimbabwe

Currency: Zimbabwe dollar 1.69 = US$1
Population: 8.58 million (27% urban)
Official language: English
Population growth rate: 3.7%
GNP per capita: US$680
Life expectancy: 49 years
Infant mortality per 1,000 births: 69
Water disease per 100,000: 6,900
Adult literacy (M/F): 81/67

UNDP resident representative: UDC Centre, First Street/Union Avenue, PO Box 4775, Harare

WATER AND SANITATION AGENCIES

Ministry of Health, Private Bag 8204, Causeway, Harare

Ministry of Local Government & Housing, Private Bag 7706, Causeway, Harare

Ministry of Lands Resettlement & Rural Development, Private Bag 7726, Causeway, Harare

Ministry of Works, Private Bag 8081, Causeway, Harare

Ministry of Natural Resources & Water Development, Private Bag 7712, Causeway, Harare

The landlocked country of Zimbabwe has a total area of 390,580km^2 and population density of 18 persons/km^2. The 1985 population was 8.58 million of which 73% were rurally based.

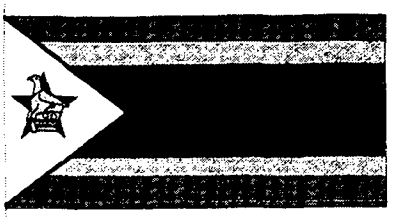
The climate is tropical but altitude is relatively high and mean annual rainfall varies from 1,400mm in the eastern highlands to 800mm in the High Veld and to less than 400mm in the Limpopo valley. In most areas surface water is unsuitable as a drinking water source.

A Decade plan was established in 1986 which established targets for rural coverage by 1990. These were for 52% rural water supply coverage and 38% rural sanitation. No specific targets have been set for urban water supply or sanitation though traditionally this has not been a problematic area.

There has, however, been enormous disparity between urban and rural areas. In 1980 it was estimated that 60% of dwellers in urban or peri-urban areas were supplied with clean water by house connections and the remaining 40% by standpipe; 79% of urban dwellers had adequate house connection sewerage arrangements and 21% either septic tanks or pit latrines. Even low income housing estates have tended to be constructed with in-house water connections and flush toilets though different criteria are being considered for new site and service schemes.

In rural areas the picture has been different with only 10% having access to adequate water supply in 1980 and 15% to adequate sanitation.

The government reports that in 1985 the picture had improved somewhat with 32% of the rural population (2,043,000 people) having access to clean water and 943,000 (15%) having



access to adequate sanitation. The government plans to increase the number of rural dwellers served with clean water to a total of 3,792,000 (52%) by 1990, and the number with adequate sanitation to 2,777,000 (38%).

A budget has been established for training staff for the sector but the government reports that this is inadequate to meet requirements.

Costs of supplying water in rural areas have been estimated at US$42 per person while the cost of providing adequate sanitation is estimated at US$20. Provision of water in rural areas is free.

The government reports considerable participation by rural communities in improvements to water supply with 40% participating in planning, 80% in construction and 50% in the operation of schemes.

An inter-ministry committee has been established to co-ordinate decade efforts. Otherwise, three government agencies are centrally involved:

- The Ministry of Health through its Department of Environmental Health which encourages digging and protection of shallow wells, spring protection, and rainwater collection. This department is also responsible for rural sanitation.
- The District Development Fund within the Ministry of Local Government, Rural and Urban Development.

UNIT COSTS OF CONSTRUCTION (US $ PER CAPITA)

Urban				Rural	
House connections	Standposts	Sewer connections	Other	Water supply	Sanitation
N/A	N/A	N/A	N/A	42	20

UNIT COSTS OF WATER PRODUCTION (US$/m^3)

Average cost	Operation average water tariff	Progressive water tariff
N/A	N/A	NO

ACTUAL AND TARGET LEVELS OF COVERAGE

Urban population served (000's)					Rural population served (000's)		
Population	House Connections	Standposts	Sewerage Connections	Other	Population	Safe water supply	Sanitation
(1980 Actual) N/A					(1980) N/A		
(1985 Actual) 2,294	N/A	N/A	N/A	N/A	(1985) 6,287	2,043	943
(1990 Targets) 2,950	N/A	N/A	N/A	N/A	(1990) 7,290	3,792	2,777

WATER CONSUMPTION l/c/d

For design		Actual	
Urban	Rural	Urban	Rural
35-40	15	25	10

Zimbabwe (continued)

The newly created Water Division is responsible for the maintenance of primary water supplies and is also equipped to provide new water supplies, mainly deep blasted wells and boreholes.

• Ministry of Energy and Water Resources and Development is primarily a technical ministry which acts on behalf of other ministries with regard to water resource planning. The ministry operates water supplies on a commercial basis. It also manages a number of piped village water supplies which supply free water and operates a fleet of drilling machines.

In addition the Ministry of Community Development and Women's Affairs promotes the participation of women in new schemes, while clean water and sanitation forms part of a general public health scheme in squatter areas around the capital.

Zimbabwe's focus has been on rural and peri-urban development with a high priority given to development of indigenous and affordable technologies.

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THE INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE DIRECTORY

Edition 3

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