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**Facing
the Challenge
of Water Supply
and Sanitation Goals
for Africa
(1993-2000)**

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**From: Africa's Children,
Africa's Future**

Background Sectoral Papers

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Overview

At the 1990 World Summit for Children, national leaders and governments pledged their commitment to reach the Goals for Children and Women in the 1990s. Among these goals was that of Universal Access to Safe Water Supplies and Sanitation by the year 2000. Nowhere in the world today is there a greater need than in Africa to advance towards the realization of these twin water and sanitation goals.

Of the 640 million people in Africa today, 310 million still lack a supply of safe drinking water, and 385 million lack sanitation facilities. Service shortages are most acute in rural areas, particularly in Eastern, Central and Western Africa, where coverage of safe drinking water supplies and adequate sanitation is below 40%. Given current rates of rural-urban migration and urban population growth, the problem of inadequate service coverage is likely to intensify in peri-urban and urban areas in the not too distant future.

Even when the world moves out of its current condition of protracted economic slow-down, many countries in Africa will still not be in a position to improve the delivery of basic services for a large proportion of their populations. The poverty affecting many African countries is currently compounded by the exigencies of structural adjustment programmes (SAPs) designed to re-establish economic equilibrium. Given this set of adverse economic circumstances, it is not surprising that meeting basic needs of water supply and sanitation, particularly in rural, slum and squatter settlements, is not at the top of many countries' political, social or economic agenda.

The intention of this paper is to help African countries facing severe resource restraints rebuild momentum behind the goal of Water and Sanitation for All. The paper reviews strengths and weaknesses in the growth of the water and sanitation sector, and advocates the development of new strategies and action plans. The primary purpose is to enable countries to achieve rapid progress in extending water and sanitation coverage during the 1990s.

Although much remains to be done, during the International Drinking Water Supply and Sanitation Decade (IDWSSD) of the 1980s, Africa demonstrated the ability to make significant progress. In absolute terms, safe water supplies in Africa were extended to an additional 168 million people over the decade, from 163 million in 1980 to 331 million in 1990; sanitation coverage also increased dramatically, from 140 million to 257 million people. However, this progress was overshadowed by rapid population increase.

Africa also learned a number of lessons during the Decade. Community participation at all stages of planning and implementation of water and sanitation services, and in their maintenance, proved essential to their sustainability. It was found that women, the main domestic water carriers and users, should also be fully involved in order to realize family health benefits. The role of government is nowadays primarily conceived as that of promoter, facilitator and catalyst. As far as technologies are concerned, to be both appropriate and maintainable, those promoted in both rural and urban areas must be low cost; consideration should be given to their standardization throughout each country; and extension and spare parts services need to be developed, along with a distribution system.

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Experience has shown that by far the most crucial factor in the success of any programme is the character of its institutional development. This realization has shifted the perception of the role of government to that of service promoter rather than service provider. This different, but pivotal, role includes the following functions: central coordination of policies; coordination among the many different actors and operators in the sector; promoter of services to the community and provider of active support and encouragement to community mechanisms. Since the community plays an essential role in service implementation, those organizations interacting with the community will need to be responsive to its needs and wishes. For this reason, a decentralized institutional structure with active participation by private enterprises is seen as cost-effective and operationally efficient.

Taking a decade of hard-won experience into account, the strategy for universal coverage of water supply and sanitation for Africa outlined in this paper consists of the following elements:

- The use of low-cost and appropriate technologies in rural areas, including the standardization of in-country technologies, and provision of backup facilities for operation and maintenance;
- The use of appropriate and cost-effective technologies in peri-urban areas, including the extension of existing urban facilities which allow for flexibility in the use of low-cost options (such as handpumps and latrines);
- Health education by means of the full range of information, education and communication (IEC) techniques, seen as a fundamental activity in all water supply and sanitation programmes;
- The acceleration of coverage to the unserved, while maintaining water supply and sanitation service to those already provided;
- The inclusion of cost-recovery elements in water supply and sanitation projects; however, in rural areas the principles of cost recovery through user payments may have to be established step by step, taking into account the ability of the beneficiaries to pay for the service;
- Rural banks and credit unions should be developed, *inter alia*, to facilitate lending to communities for both water supply and sanitation projects;
- Increased assistance should be given by government and donors to water supply and sanitation projects that facilitate capacity building, promote low-cost, appropriate technologies and insist on community participation in planning, implementation and management;
- The lead role in coordinating activities for planning, management, monitoring and facilitation of resources, including guiding the role of the private sector, should be assumed by government;
- The importance of women's role in rural and peri-urban area development should be recognized, and women enabled to become partners in water and sanitation service development;
- Attention should be paid to potentially serious environmental impacts in peri-urban areas due to inadequate water supply and sanitation.

- At the national level, the need for a clear strategy formulation on the following aspects of water and sanitation policy should be recognized:
 - Effective demand
 - Rehabilitation or rejuvenation of existing assets
 - Credit and repayment mechanisms and institutions
 - Technology choice
 - Cost control
 - Training
 - Applied research and development
 - Community participation
 - Standardization
 - Replication
 - Decentralization
 - Privatization
 - Collaboration and coordination among NGOs, donors
 - Information, education and communication
 - National programme of action (NPA).

This paper attempts to provide broad estimates of the costs of meeting the 1990s water supply and sanitation goals for Africa. Any detailed costing will need to be country-specific, taking into account a number of factors including terrain and geological formations.

Applying these strategies for universal coverage in Africa, it is estimated that for water supply the cost will amount to a total of US\$42 billion—approximately US\$14 billion each for urban, peri-urban and rural areas. The cost of universal coverage in sanitation is estimated at a total of US\$34 billion; US\$25 billion for urban areas, US\$4 billion for peri-urban areas, and US\$5 billion for rural areas.

Over the eight-year period 1993–2000, this would require an average of US\$5.2 billion for water and US\$4.2 billion for sanitation, of which US\$3.5 billion and US\$1.1 billion, respectively, would be for low-cost systems. It may be assumed that half of this would be provided by governments and communities, and that the need for external support would be around an additional US\$2.3 billion per year.

Goals for the Year 2000

In spite of a pessimistic international climate, it is possible to face with confidence the challenge of "Safe Drinking Water and Sanitation for All" in Africa by the year 2000. The most important lessons of the 1980s show that with a combination of appropriate policy reforms, accelerated investment in the sector, proper management, skilled manpower, community participation and improved operation and maintenance, it will be possible to move a considerable distance towards achievement of the goals.

Of the 640 million people in Africa (1990), 310 million still lacked safe drinking water, and 385 million lacked sanitation facilities. If water supply and sanitation projects continue to progress at the same pace, and with the same strategies as in the 1980s, the gap between the served and the unserved will increase by 18% for water supply and 28% for sanitation by the year 2000. Thus, it is necessary to redouble efforts, through the mobilization of additional resources, the restructuring of government expenditure and external assistance, and the redefinition of operational strategies, if the goals are to remain within striking distance.

In the World Declaration for the Survival, Protection and Development of Children at the Summit for Children on 30 September 1990, global leaders expressed their anguish that "each day 40,000 children die from malnutrition and disease including acquired immunodeficiency syndrome (AIDS), from the lack of clean water and inadequate sanitation and from the effects of the drug problem". It is significant that the goals for water and sanitation have been included as part of the human development agenda for the 1990s. Programmes to improve access to safe water and sanitation are not independent, but interact with others as parts of a much larger scenario of human development and national capacity-building.

In Africa, as elsewhere, those in the lowest socio-economic groups are disproportionately

threatened by the environmental hazards and health risks posed by pollution, inadequate housing, poor sanitation, polluted water and lack of basic services. Many of the poorest rural people live in fragile ecological environments where margins are narrow at the best of times. Repeated drought and, in some cases, conflict have forced many people to migrate to urban areas or to places far from their own traditional farming lands. Added to this, service cuts and high food prices have been imposed by structural adjustment programmes, the brunt of whose costs fall on those least able to bear them. In these circumstances, the most difficult challenge is to reach the poorest, unserved populations, whose numbers are rapidly growing.

Present Status of Water and Sanitation in Africa

In absolute terms, access to safe water was extended from 163 million people in Africa in 1980 to 331 million in 1990; thus, by 1990, more than 50% of the population was covered. In the case of sanitation, coverage was increased from 140 million in 1980 to 257 million in 1990; thus, by 1990, 40% of the population was covered (Table 1).

1990 World Summit for Children Goals

The specific goals for water and sanitation set by the 1990 World Summit for Children for Water and Sanitation are:

- Universal access to safe drinking water;
- Universal access to sanitary means of excreta disposal;
- Eradication of guinea worm disease (dracunculiasis);
- 50% reduction of deaths due to diarrhoea in children under the age of five years and 25% reduction in the diarrhoea incidence rate.

Table 1: Water Supply and Sanitation Coverage in Africa, 1980-1990

	1980		1990	
	Number served millions	%	Number served millions	%
Water Supply				
Urban	87	66	165	76
Rural	76	22	166	39
Total	163	34	331	51
Sanitation				
Urban	71	54	160	74
Rural	69	20	97	23
Total	140	29	257	40
Total Population				
Urban	132		217	
Rural	345		424	
Total	477		641	

Sources: Population figures are from United Nations, *World Population Prospects 1990*.

Water supply coverage figures for 1980 are from WHO.

Water supply coverage figures for 1990 are calculated from individual country data provided by WHO and from UNICEF *Statistics on Children in UNICEF Assisted Countries*, June 1992. (Coverage figure for water supply in South Africa has been guesstimated at 90% for urban, 50% for rural.)

Sanitation coverage figures are from WHO.

This is a significant achievement considering the difficult economic conditions that most of Africa faced in the 1980s. However, the achievements in terms of numbers of people served and lives enhanced are somewhat overshadowed by the rapid increase in population. While the numbers served by urban water supplies increased from 87 million to 165 million people, the coverage only increased by 10% (from 66% to 76% of the urban population). The numbers of people served by urban sanitation more than doubled, from 71 million to 160 million; while coverage only increased from 54% to 74%.

Rural water supply coverage during the 1980s was extended from 76 million people to 166 million, which represented a coverage increase from 22% to 39%. Rural sanitation coverage also showed a slight increase from 20% to 23%, with population coverage increasing from 69 million to

97 million. Table 2 shows the coverage of water supply on a regional basis for 1990. The number of people served is below 40% for the rural areas of Eastern, Central and Western Africa. Table 3 shows coverage of water supply in Africa in 1990 by individual country, the unserved population in that year and additional population that has to be served to the year 2000.

If current trends persist, the projections for urban water supply and sanitation coverage are that they will fall to 69% for water supply and 71% for sanitation. Rural water supply is projected to increase to 50% from 39%, and rural sanitation only marginally to 24% from 23% (Figure 1).

With nearly 310 million people left unsupplied with safe water and 384 million without proper sanitation facilities in 1990, and with a projected population increase of around 224 million by the year 2000, the target population for extension of

coverage by the year 2000 will be around 534 million for water and 609 million for sanitation. To reach this target would require that the efforts of the 1980s be multiplied by five times during the 1990s. The difficulties of reaching the goal are exacerbated by the rising costs of implementation and the inaccessibility of many rural areas. Instead of acceleration, there has actually been a slowing of pace in service delivery up to now, partly caused by a shortage of trained manpower and an absence of well-defined policies. Failure to meet cost-recovery targets in urban areas has slowed down the extension of services to unserved and underserved neighbourhoods.

Needs are immense, as indicated by the computations of population to be served (Figure 1 and Table 3). In order to take advantage of economies of scale and scope, reducing costs but at the same time maintaining sustainability, an integrated approach is needed, particularly for rural areas. This integration has to be both vertical and horizontal.

Vertical integration implies that a number of elements are planned in a synchronized fashion:

the provision of water points; the standardization of water and sanitation technology; the design and installation of operational and maintenance facilities; the local manufacture of sanitation items (latrine bowls, vent-pipes, etc.) and, wherever possible, of handpumps; the establishment of outlets for spare parts and their standardization; the setting up of mechanisms for community participation and for overall management of local water and sanitation services.

Horizontal integration means combining the water and sanitation programmes with health and hygiene education, and providing opportunities for women to use the time they no longer spend carrying water long distances in domestic improvements, economic self-advancement and providing better nutrition, stimulation and education for their children.

Actions for both the vertical and horizontal integration of water and sanitation programmes should be undertaken as part of the initial action of providing the water point. Financial, manpower and material resources are not the only factors inhibiting the spread of services; the goal of Water

Table 2: Coverage of Water Supply in Africa by Regions, 1990

	URBAN			RURAL			TOTAL		
	Served millions	Un served %	Un served millions	Served millions	Un served %	Un served millions	Served millions	Un served %	Un served millions
Northern	53	93	4	39	67	19	92	80	23
Eastern	21	58	14	37	28	94	58	35	108
Western	48	77	15	47	36	84	95	49	99
Central	16	59	11	18	33	37	34	42	48
Southern	27	79	8	25	49	24	52	61	32
Total	165	76	52	166	39	258	331	51	310

Source: Population figures are from United Nations, *World Population Prospects 1990*. Water supply coverage figures for 1990 (number served) are calculated from the individual country data provided by WHO, April/June 1992, and from UNICEF *Statistics on Children in UNICEF Assisted Countries*, June 1992, for those countries not covered by the WHO data. (Coverage figure for water supply in South Africa has been guesstimated at 90% for urban, 50% for rural)

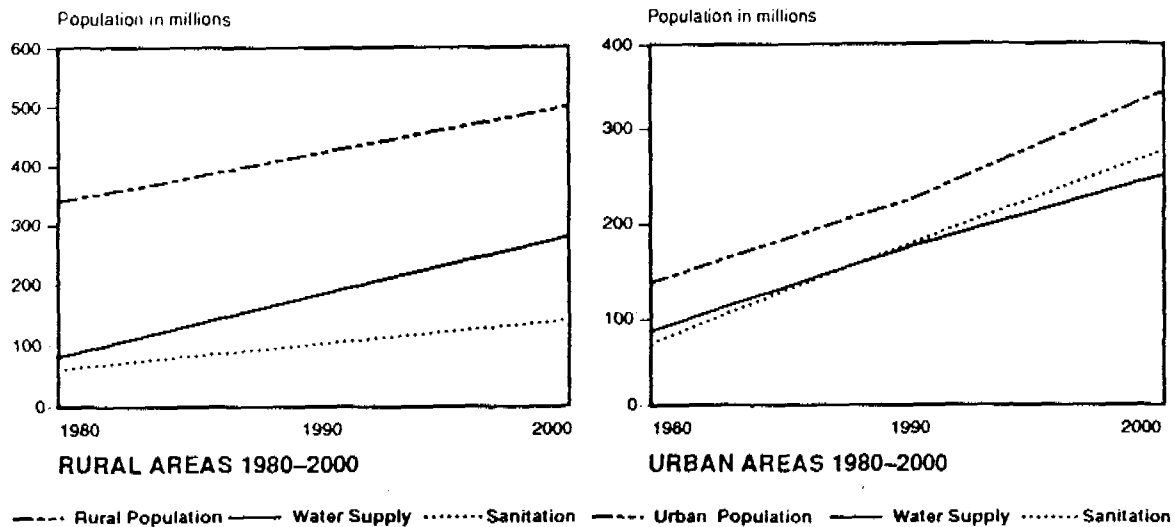


Figure 1: Water Supply and Sanitation Coverage Trends in Africa

Source: Calculated from data available from WHO/UNICEF.

and Sanitation for All will not be reached unless the culture and philosophy traditionally governing activities in the public health engineering sector are radically changed. Serious rethinking on the part of national governments should precipitate a combination of policy changes, legislation, strategic financial and material inputs, and vigorous promotion of the idea of community participation in the provision of water supply and sanitation services.

Lessons from the 1980s

In the 1980s, an estimated US\$15 billion was spent in Africa on water supply and sanitation by governments, international agencies and other donors. However, about 80% of this expenditure was on high-cost technology, primarily for the improvement of services to people who already had access to them. Only 20% of the expenditure was on low-cost, appropriate technologies for the unserved poor. The external support component in the total investment is estimated at 70% or about US\$1 billion per year.¹

Despite the relatively modest investment in Africa, considerable progress was achieved in the 1980s and a number of lessons have been learned for the 1990s. The principal lesson is the need to build into water supply and sanitation programmes an element of strong community participation, particularly from women, to instil a sense of community service ownership. This is necessary for the sustainability of services, although it does not dispense with the need for government to take responsibility for providing the necessary support. The government plays a key role in the development of infrastructure and acts as a promoter, facilitator and catalyst for the whole process of service provision, management and maintenance.

The Role of Women

The involvement of women at all stages of a water supply and sanitation project is nowadays regarded as essential. In many rural areas of Africa it is not uncommon for women to spend 15% to 25% of their time collecting water. Improving women's access to safe water supplies can substantially

Table 3: Coverage of Water Supply in Africa

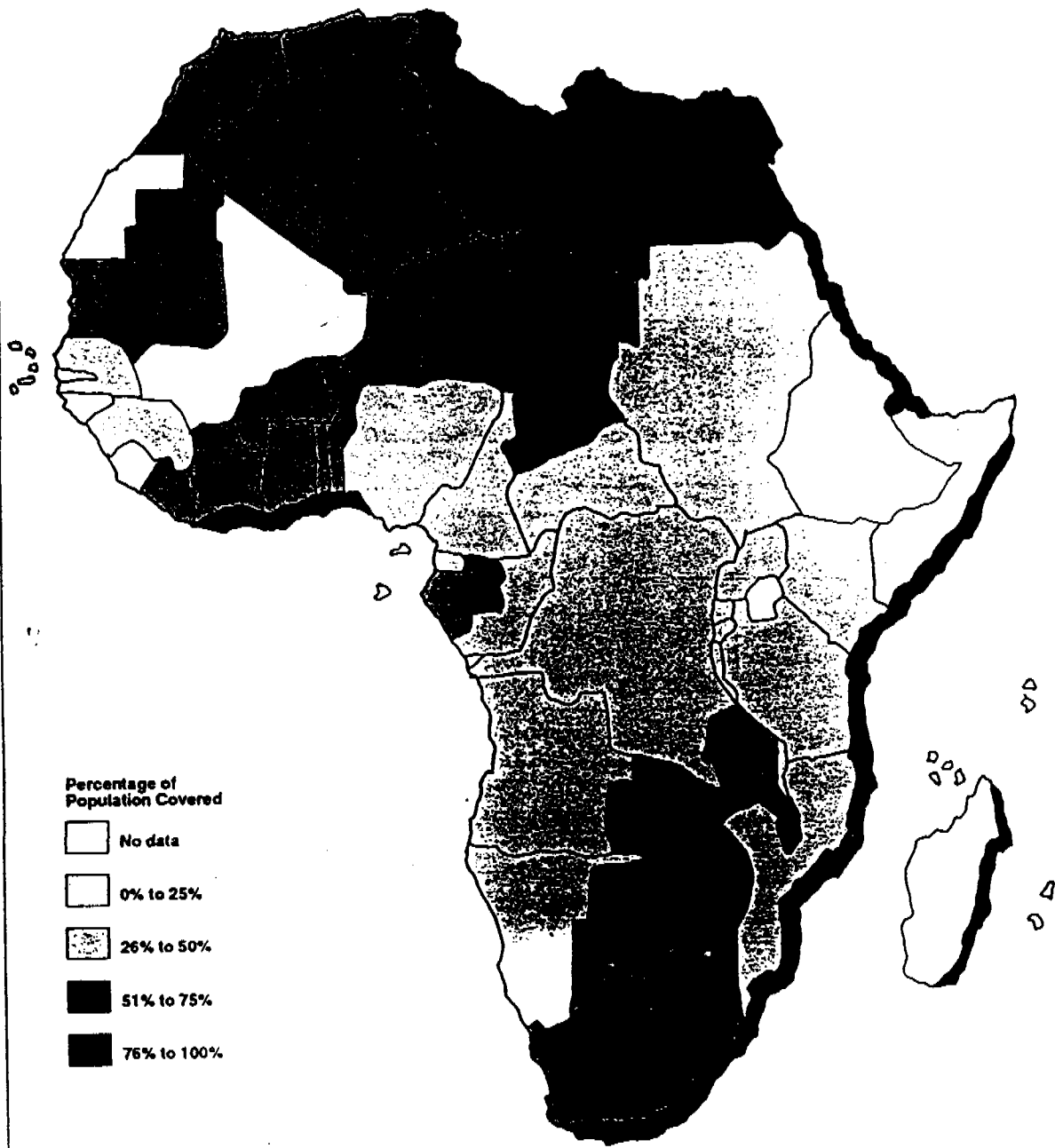
	Population 1990 (in millions)			Percentage of population served - 1990			Unserved population 1990 (in millions)			Additional population to year 2000 (in millions)			Total population to be served to year 2000 (in millions)
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
North Africa													
Algeria	12.9	12.0	24.9	85	55	71	1.9	5.4	7.3	6.7	1.2	7.9	15.3
Egypt	24.5	28.0	52.4	93	92	93	1.8	2.2	3.9	10.3	1.5	11.8	15.7
Libya	3.2	1.4	4.6	100	80	94	0.0	0.3	0.3	1.8	0.2	2.0	2.3
Morocco	12.0	13.0	25.0	96	19	56	0.4	10.6	11.0	5.4	1.1	6.5	17.5
Tunisia	4.4	3.7	8.1	97	86	92	0.1	0.5	0.7	1.4	0.4	1.7	2.4
Total	57.0	58.1	115.1	93	67	80	4.3	18.9	23.2	25.5	4.4	29.9	53.2
Eastern Africa													
Comoros	0.2	0.4	0.6	33	70	59	0.1	0.1	0.2	0.1	0.1	0.2	0.4
Djibouti	0.3	0.1	0.4	100	95	99	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Ethiopia	6.4	42.9	49.2	66	13	20	2.1	37.3	39.5	4.8	12.3	17.1	56.6
Kenya	5.7	18.4	24.0	57	45	48	2.4	10.0	12.5	5.5	5.6	11.0	26.5
Madagascar	2.9	9.1	12.0	58	12	23	1.2	8.1	9.3	2.3	2.4	4.6	13.9
Mauritius	0.4	0.6	1.1	100	96	98	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Seychelles	0.1		0.1			100							
Somalia	2.7	4.8	7.5	50	29	37	1.4	3.4	4.8	1.6	0.6	2.2	7.0
Sudan	5.6	19.7	25.2	73	33	42	1.5	13.2	14.7	3.4	5.1	8.4	23.1
Tanzania	9.0	18.4	27.3	42	50	47	5.2	9.2	14.4	9.5	2.9	12.3	26.7
Uganda	2.0	16.8	18.8	57	26	29	0.8	12.4	13.3	1.8	6.4	8.2	21.5
Total	35.1	131.1	166.2	58	28	35	14.7	93.8	108.5	29.0	35.3	64.3	172.5
Western Africa													
Benin	1.7	2.9	4.6	80	44	57	0.4	1.6	2.0	1.1	0.7	1.7	3.7
Burkina Faso	0.8	8.2	9.0	95	62	65	0.0	3.1	3.1	0.7	2.4	3.1	6.2
Cape Verde	0.1	0.3	0.4	83	50	59	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Côte d'Ivoire	4.9	7.1	12.0	69	75	73	1.5	1.8	3.3	3.4	2.2	5.6	8.9
Gambia	0.2	0.7	0.9	100	47	59	0.0	0.4	0.4	0.1	0.1	0.3	0.7
Ghana	5.0	10.1	15.0	54	56	56	2.3	4.4	6.7	2.8	2.7	5.5	12.2
Guinea/Conakry	1.5	4.3	5.8	82	30	43	0.3	3.0	3.3	1.1	1.0	2.1	5.4
Guinea/Bissau	0.2	0.8	1.0	21	29	27	0.2	0.5	0.7	0.1	0.1	0.2	0.9
Liberia	1.2	1.4	2.6	83	25	51	0.2	1.0	1.2	0.8	0.2	1.0	2.2
Mali	1.8	7.4	9.2	39	3	10	1.1	7.2	8.3	1.2	2.3	3.5	11.8
Mauritania	0.9	1.1	2.0	83	65	73	0.2	0.4	0.5	0.6	0.0	0.6	1.1
Niger	1.5	6.2	7.7	75	48	53	0.4	3.2	3.6	1.4	1.6	3.0	6.6
Nigeria	38.2	70.4	108.5	81	29	47	7.2	50.0	57.2	26.6	14.5	41.1	98.3
Senegal	2.8	4.5	7.3	82	24	46	0.5	3.4	3.9	1.5	0.9	2.4	6.3
Sierra Leone	1.3	2.8	4.2	78	20	38	0.3	2.3	2.6	0.9	0.4	1.3	3.9
Togo	0.9	2.6	3.5	85	49	59	0.1	1.3	1.5	0.7	0.6	1.3	2.8
Total	63.0	130.7	193.7	77	36	49	14.5	83.7	98.2	43.1	29.7	72.8	171.0

Table 3 (continued)

	Population 1990 (in millions)			Percentage of population served – 1990			Unserved population 1990 (in millions)			Additional population to year 2000 (in millions)			Total population to be served to year 2000 (in millions)
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Central Africa													
Angola	2.8	7.2	10.0	95	18	40	0.1	5.9	6.1	2.0	1.3	3.3	9.4
Burundi	0.3	5.2	5.5	92	41	44	0.0	3.0	3.0	0.2	1.6	1.9	4.9
Cameroon	4.9	7.0	11.8	46	39	42	2.6	4.2	6.8	3.6	1.3	4.9	11.8
Central African Republic	1.4	1.6	3.0	32	21	26	1.0	1.3	2.3	0.8	0.2	1.0	3.2
Chad	1.7	4.0	5.7	30	70	58	1.2	1.2	2.4	1.2	0.5	1.7	4.1
Congo	0.9	1.4	2.3	92	2	38	0.0	1.3	1.3	0.6	0.3	0.9	2.2
Equatorial Guinea	0.1	0.3	0.4	85	16	36	0.0	0.2	0.2	0.0	0.0	0.1	0.2
Gabon	0.5	0.6	1.2	90	50	68	0.0	0.3	0.3	0.3	0.1	0.4	0.7
Rwanda	0.6	6.7	7.2	79	48	50	0.1	3.5	3.6	0.6	2.4	3.0	6.6
Sao Tome & Principe	0.1		0.1			99							
Zaire	14.0	21.5	35.6	58	26	38	5.9	16.0	21.9	8.8	4.9	13.6	35.5
Total	27.4	55.4	82.8	59	33	42	10.9	37.0	47.9	18.2	12.6	30.8	78.6
Southern Africa													
Botswana	0.4	0.9	1.3	72	88	65	0.1	0.0	0.1	0.4	0.4	0.8	0.9
Lesotho	0.4	1.4	1.8	42	58	55	0.2	0.6	0.8	0.3	0.3	0.6	1.4
Malawi	1.0	7.7	8.7	96	48	54	0.0	4.0	4.0	0.9	2.8	3.7	7.7
Mozambique	4.2	11.5	15.7	30	26	27	2.9	8.5	11.4	4.2	0.6	4.8	16.2
Namibia	0.5	1.3	1.8	53	47	49	0.2	0.7	0.9	0.3	0.3	0.7	1.6
South Africa	21.0	14.3	35.3	90	50	74	2.1	7.1	9.2	7.8	0.6	8.4	17.6
Swaziland	0.3	0.5	0.8	61	54	57	0.1	0.2	0.3	0.2	0.0	0.2	0.5
Zambia	4.2	4.2	8.4	73	44	58	1.2	2.4	3.5	3.0	0.8	3.8	7.3
Zimbabwe	2.7	7.0	9.7	82	80	80	0.5	1.4	1.9	1.9	1.6	3.4	5.3
Total	34.6	48.9	83.4	79	49	61	7.3	24.9	32.2	19.0	7.4	26.4	58.5
Total Africa	217.1	424.2	641.3	76	39	52	51.7	258.3	310.0	134.8	89.4	224.2	534.2

Sources: Population figures are from United Nations, *World Population Prospects 1990*.
Coverage figures are from WHO and UNICEF as presently available.

Africa's Safe Water Supply, 1990
Total Population with Access to Safe Water Supply



Sources: WHO and UNICEF

reduce their labour. For instance, in a village on the Mueda Plateau in Mozambique, the average time that women spent collecting water was reduced from 2 hours to 25 minutes a day by the provision of a convenient water supply.²

Women's participation in the development, maintenance and management of water supply and sanitation facilities has been shown to be instrumental in ensuring their sustainability. Women's participation has also enhanced linkage to other sectors such as hygiene education, sanitation and nutrition.

The issue of gender sensitivity has gained much recognition in Africa during the last decade. However, women's traditional roles continue to dominate most social environments. Women have a crucial role to play in the water supply and environmental sanitation revolution. Women are not only the prime targets of health and hygiene education, but the main message-bearers, through the training of their children and the incorporation of personal and domestic cleanliness codes into their household management. As water carriers, and as the main users of domestic supplies, women

are also key beneficiaries of services. Only through continued education can women begin to empower themselves and elevate their social status and thus make an even greater contribution to the health of their communities and of their children.

Community Participation

During the last decade significant advances were made in Africa in the development of models for community participation in water supply and sanitation. In countries such as Botswana, Burkina Faso, Ghana, Guinea, Kenya, Malawi, Uganda and Nigeria community participation has proved to be the means whereby service delivery is sustainable over time.

In Africa the provision of a safe and convenient water supply is a prime entry point for building community enterprise. Since water is a basic human need, the incentive to participate in its provision, management and the proper use of facilities is strong. For the same reason, it is also possible to mobilize the community to make a financial contribution for the provision of the

Ghana's Experience in Rural Water Supply

Some 250 piped water supply systems have been constructed in Ghana during the last 40 years. They provide water for 3.6 million urban and 1.7 million rural people.

About 30% of the rural population has had an improved water supply system (handpump or piped) installed in their community during the last 20 years, providing a potential service to 3.7 million of the country's 9.7 million rural population. Currently, piped service is intermittent, and around 30% of the handpumps in the country are not operational, reducing rural service coverage to about 20%.

An effective monitoring programme operating at the district and regional level is essential for the proper management of a rural water supply service. A number of benefits would be realized if communities purchase their handpump and:

- sector development becomes "demand driven", and government subsidies are provided for communities that most want improved services;
- communities sufficiently value the system to maintain it, since they have become its owner; and
- a market for pumps and spare parts is created with pumps selected on the basis of cost, performance and availability rather than on criteria imposed by the funding agency.

Source: UNDP/World Bank, *Republic of Ghana Rural Water Supply and Sanitation Sector Strategy*, May 1991, p. 3, 24.

water supply and for its operation and maintenance. A key requirement is the development of a supporting infrastructure—a task in which the government should play the key role. A by-product of community financing and management in water and sanitation is that the same community spirit and enterprise can be harnessed to efforts for health, nutrition and education.

Community participation is not a panacea, but it is an essential ingredient of sustainable water and sanitation services. Community participation does not mean presenting the community with a package and inviting their support; it requires involving the community, especially the women members, as an integral part of all project development, implementation and operation, varying only in degree and modalities between conventional urban, peri-urban or rural projects.³

The Impact on Health

Lack of safe water supplies, inadequate sanitation and poor hygiene account for the majority of all cases of diarrhoeal disease. If the incidence of diarrhoeal disease were reduced by 25%, the lives of 1.25 million children could be saved. Studies by the Water and Sanitation for Health Project indicate an overall 55% median reduction in child mortality with improved sanitation, water quantity and quality.⁴ Effective hygiene education makes an even greater impact. A number of diarrhoeal diseases—cholera, typhoid and paratyphoid—constitute serious threats to life. “Providing access to sanitation and clean water would not eradicate all these diseases, but it would be the single most effective means of alleviating human distress”.⁵

The need to eradicate guinea worm disease (dracunculiasis) has been highlighted in various global consultations as well as at the 1990 World Summit for Children. Around 650,000 cases have been reported from 19 countries in Africa (Table 4). In Nigeria, the incidence of guinea worm has been reduced by around 100,000 cases, and in Ghana by

50%, by regular case search, provision of safe drinking water and hygiene education. If there is the will, it is possible to eradicate this “fiery snake” from Africa by the year 2000.

The provision of safe, good quality water will not on its own achieve the required impact on health. Safe excreta disposal and the use of water for personal and domestic hygiene are even more important. Disposal of waste, both household and human, fluid and solid, pose more serious technical, financial and health problems in urban areas. Increased water supplies in crowded urban areas without adequate excreta disposal facilities actually increase health hazards and are often the focal points of epidemics. Therefore, effective coordination between water supply and sanitation programmes needs to be encouraged.

At present, agencies that endeavour to put into effect combined water supply and sanitation programmes find difficulties in their efficient implementation. Some of these difficulties stem

Elements Necessary to Create the “Enabling Environment” in Which Community Management Can Occur

- The information required to make sound decisions is available to the community;
- Technologies and levels of service are commensurate with the community's needs and capacity to finance, manage and maintain them;
- There is a policy framework in place which permits and supports community management. This implies flexibility in programme design and implementation;
- Effective external support services are available from governments, donors and the private sector (training, technical advice, credit, construction, contractors, etc.).

Source: *Main Report, Global Forum, Oslo 18–19 September 1991, Water and Sanitation Collaborative Council/WHO, Geneva, January 1992, 18 p.*

**Table 4: Current African Status of Guinea Worm Eradication Effort
Summary Table, February 1992**

Country	Nat'l Prog. of Action	Nat'l Coordin. Appointd.	Elimin. Target Date	Certif. Target Date	Nat'l Search Conducted	Nat'l Search Planned	Monthly Village Based Surveil.	Cases 1990	Cases 1991
Benin	Yes	Yes	1995	1998	Feb.-June '90	1993	Beginning	+37,414	
Burkina-Faso	Yes	Yes	1995	1998	Nov.-Dec. '90	1993	Yes	42,187	
Cameroon	Yes	Yes	1993	1998	November '91	1992	Yes	742	
Central African Rep.	No	No		1999	Under way				
Chad	Yes	Yes	1995	1998	No				
Côte d'Ivoire	Yes	Yes	1995	1998	Under way		No	1,306	20,064
Ethiopia	Draft	Yes	1995	1998	Under way		No		
Gambia	No	Yes		1996					
Ghana	Yes	Yes	1993	1998	1989-1990		Yes	123,793	66,697
Guinea	No	Yes		1996					
Kenya	Yes	Yes	1993	1995	1989				
Mali	Yes	Yes	1995	1998					13,793
Mauritania	Yes	Yes	1995	1998				8,034	
Niger	Yes	Yes	1995	1998	Oct.-Nov. '91	1993	No		33,317
Nigeria	Yes	Yes	1995	1998	Jul.-Dec. '91		Yes	394,732	290,000
Senegal	Yes	Yes	1995	1998	Apr.-Jul. '91	1993			1,686
Sudan	Draft	Yes	1995	1998		Feb. '92			
Togo	Yes	Yes	1995	1998	Jan.-Mar. '91		Beginning		+5,118
Uganda	Yes	Yes	1995	1998	Sept. '91 - Present				120,259

Source: UNICEF.

from differences in existing technology and the pace of technological development. But most stem from the slow pace of public health behaviour change. Health and hygiene education are often well-established components of government programmes, but sanitary behaviour is normally governed by cultural practice, and changing it means profound changes in lifestyle which can only be accomplished gradually and through continuous education. Information, education and communication should be at the core of the Water

Supply and Environmental Sanitation programme in every country and should not be diluted in comparison to the hardware input.

Technology Choice

In the last decade, the choice of technology for water supply and sanitation programmes became an important issue; it remains important today. The low-cost technologies which were not widely accepted at the beginning of the 1980s have today

**Mothers with Guinea Worm:
What Happened to Their Children?**

Women have a very important role as the "front line" of defense in the maintenance of health and in the prevention and cure of disease within their households. It is women who make the diagnosis of illness and initiate the search for a cure. Women's roles in food production for the household make them important decision makers in terms of their children's nutritional well-being. Studies in Nigeria, in the two endemic areas of Idere in Oyo State and Ilorin in Kwara State, showed that a mother's inability to care for herself due to guinea worm affected her ability to care for her infant. The substantial economic loss during the illness causes depletion of food in a household. The workload of an incapacitated mother is always transferred first to the girl child.

Source: Yacoob, May, *Mothers With Guinea Worm: What Happens to Their Children?*, prepared for presentation at the Second Workshop on Dracunculiasis in Africa, Ghana, March 14-18, 1988, WASH, Arlington, VA, p. 1.

been adopted in almost all countries. Consensus has also been reached that the technology selected must be appropriate to the sociocultural environment of the community, to the financial capacity of the users and to the users' ability to operate and maintain it. Research and development in this field is still continuing. Developmental work has been undertaken in Nigeria, the Sudan, Uganda and Kenya, both by government and the private sector. Their familiarization with needs and opportunities, and applied research into the development of appropriate technology for water supplies and sanitation, must continue.

Emergency Programmes

The repeated droughts of the 1980s and the current drought in Southern Africa have forced development planners to consider seriously the allocation of financial resources to water supply. In situations of natural disaster or civil strife,

water supply and sanitation is always a central issue in emergency relief operations. Experience has shown that it is necessary to plan for longer-term solutions to the water supply, sanitation and soil conservation needs in areas vulnerable to repeated cycles of natural disaster, and that populations displaced for long periods of time also need more permanent solutions.

Challenges for the 1990s

The guiding principle adopted in the New Delhi Statement issued at the Global Consultation on Safe Water and Sanitation for the 1990s, in September 1990, was "some for all, rather than more for some"; that is, ensuring at least a minimum amount of water and sanitation for those who currently have no service, which means targeting the vulnerable, the unserved and the poor.⁶ The active involvement of governments is needed to promote water supply and sanitation for the politically voiceless rural and peri-urban population, and those suffering from

**Programmatic Needs Identified from
Lessons Learned in the 1980s**

- Increased community participation and involvement of women;
- Better and more innovative financial management;
- Improved and systematic monitoring;
- Improved operation and maintenance;
- Improved delivery system;
- Governmental role as promoter and catalyst;
- Better coordination among all actors and sectors;
- Mid-term and longer-term plans to apply during natural calamities and emergencies.

the consequences of drought and environmental degradation. Governments also need to coordinate water and sanitation programmes at the country level between all participants: local authorities, bilateral donors, international agencies, NGOs and the private sector.

At the same time in the New Delhi Statement, the role of the government was also defined as "promoter" and not "provider". This terminology is often misunderstood. The role of the government in the provision of services to the community irrespective of demand was not encouraged. Instead, the role of the government is to act as a catalyst and supporter of community endeavour; to provide a network for the delivery of hardware, spare parts and IEC materials; and to provide coordination of all actors in the sector.

National Coordination and Capacity Building

In developing a well-guided effort to meet the Water and Sanitation Goals, the first step is the formation of a National Committee for Safe Water Supply and Sanitation for policy-making at the national level. Some countries have already constituted such a committee, chaired either by the minister most directly concerned or by the head of the State. The National Committee should be broad-based and include experts and academic representatives from various disciplines, such as health, nutrition, education and sociology, as well as external support agencies (ESAs) and NGOs. The National Committee should provide long-term guidelines for the sector and bring about intersectoral integration.

The partnership between the government, bilateral donors, multilateral agencies, NGOs and community should be well understood and coordinated. To strengthen the role of the government in this respect, it is necessary to establish a monitoring cell within the govern-

ment policy-making body. The international donors may help each government, where requested, to establish such a cell to advise, monitor, coordinate and evaluate the programmes. The cell may draw on support from UNICEF, UNDP, WHO or from other bilateral agencies. This will help foster country-level collaboration, encourage cooperation and provide the government with the necessary tools for planning, monitoring and evaluation.

The role of community enterprise and management is complementary to the role of government. Within the rural or peri-urban community, the role of the village (or neighbourhood) water committee has proved a successful institutional approach. With appropriate local modification to match the political, social and cultural context, the establishment of water committees is fundamental to successful programme outcomes. The committees are responsible for local-level planning, implementation, supervision, operation and maintenance of the installations; they also enable the development of local capacity building.

During the 1980s, the importance of capacity building was one of the crucial lessons learned. Where there was an absence of clear guidelines from the national level, the different players were inclined to act in a haphazard fashion. This could lead to donor agencies and NGOs bypassing local authorities and institutions. The efficiency of "bypassing" government structures—even in the short term—is easily overrated.⁷ When the donor withdraws in the post-implementation period, there is bound to be confusion and the project may lose ground and cease to be sustainable.

It is to avoid such an outcome that more emphasis during the 1990s is placed on capacity building at all planning, programmatic and service-delivery levels. The success of the strategy depends on the commitment and

understanding of all players from national to community level. This, in turn, depends on clear decisions and open and efficient information exchange. At the same time, appropriate policy and legislative mechanisms must define mandates, responsibilities and incentives and pinpoint accountability throughout the entire institutional framework.

As in the last decade, the key international agencies in the sector have an important role to play. UNDP, UNICEF, WHO and the UNDP/World Bank Water and Sanitation Group will continue to act as coordinators, at the international level, of new policy perspectives harvested from up-to-date experience. The Water Supply and Sanitation Collaborative Council will help communicate the broad policy consensus through regional as well as national committees. The Regional Orientation Committee (ROC), in close collaboration with regional entities such as the OAU, ECA and ECLA, may facilitate regional cooperation and collaboration in the future.

Simultaneously, capacity building requires programmes of intensive training at different levels. Field visits, study tours and exchange of information between developing countries should be assisted as well as encouraged by ESAs.

The key elements in capacity building are the following:

- Training for policy formulation, coordination, planning, management, implementation, cost evaluation and service monitoring;
- Consideration of whether incentives are needed to retain local professional staff, especially for deprived areas;
- The involvement, via incentives or other means, of local institutions in training, manufacture, research and development;
- The promotion of information exchange via local networking.

Rural Water Supplies

The gateway to success for the expansion of rural water supplies and sanitation in Africa in the 1990s will be the wholehearted adoption of low-cost, appropriate technologies together with efforts at cost reduction and cost control. The lowest-cost technology needs to be matched to the particular geological and regional conditions, bearing in mind the need for sustainability. This means that the cheapest option is not always the most appropriate. For example, boreholes with handpumps are often the optimal choice in spite of lower-cost alternatives such as hand-dug wells with pumps, spring protection, rainwater harvesting and the use of wind or solar power. Alternatively, in some rural areas with a high population density, stand-pipes may be the most cost-effective and therefore the most appropriate option.

During the IDWSSD, three handpumps in particular came into prominence in helping to extend rural water supply coverage. The India Mark II (later brought out in a more easily maintainable model—the Mark III) was a joint endeavour of voluntary agencies, UNICEF, UNDP and the Indian Government. This deep-well handpump has been produced in a few countries in Africa and exported to many more where hydrogeological conditions are favourable to its use. The Afridev pump was developed in Africa and extensively field tested there by the UNDP/World Bank group. The key feature of this medium- to deep-well pump is the extreme facility with which it is maintained, a feature known as VLOM (village-level operation and maintenance); it is manufactured in a few African countries and in Asia. The third pump is the Tara pump of Bangladesh, a direct-action pump for shallow wells. This pump was also developed with the support of UNDP/World Bank and UNICEF, and is now being manufactured in Asia, Europe and Latin America.

Although the approach known as VLOM was originally perceived as a design target for handpumps, problems of operation and maintenance (O&M) lie not only with the pump but in the choice and standardization of the borehole system. Often the water supply may fail as a result of the borehole itself being defective, having been drilled to an inadequate depth or being inadequately protected. It is necessary to study the respective merits and demerits of a particular pump for different hydrogeological environments; it is also necessary for the government to standardize the choice of pumps in different settings. The operation and maintenance system can then be developed accordingly.

It is also necessary for donor agencies to coordinate among themselves and standardize hardware options. For example, for Ethiopia, 8 donors purchased 14 varieties of rigs from the same

manufacturers, with 9 different carriers, 4 types of compressors, 16 engines, 4 mud pumps, 9 hydraulic pumps, 8 hydraulic motors and 4 hydraulic winches.

The appropriate technology must be region- or country-specific and acceptable to the community. While the borehole with handpump may be the dominant technology, other approaches such as hand-dug wells with pumps, spring protection, rainwater harvesting, and the use of solar or wind energy may be appropriate for some areas. Depending on the willingness of the community to pay for services, the technology can be upgraded to household piped water supplies in peri-urban and urban areas. But in most of rural Africa, the handpump option will predominate.

The key criterion for selecting a low-cost, handpump-based-technology option is the availability of good quality underground water. The

Lessons in Community Participation from Seven West African Rural Water Supply Projects

Decision-Making: The projects were successful in establishing community management primarily because the communities wanted their water points and were prepared to ensure that they stayed in operation. The details of how a water point is managed are best worked out by the individual communities themselves. They decide how and when to collect funds, and they decide the rules of water point use.

Community Involvement: Communities can own and manage their water points, and this management is sustainable and replicable. The main elements of the management system demonstrated by the seven projects are an effective extension service supportive of community capacity; the willingness of the community to have and own an improved water supply (possibly exhibited by up-front financial commitment); the establishment of a representative water committee and community fund for management of repairs and maintenance of the pump surrounds; the establishment of a good maintenance system which uses trained community and local artisans and which is as autonomous as possible from the project and/or government; and an effective spare parts distribution system.

Maintenance and Spare Parts Distribution: Community and area mechanics are capable of maintaining certain pumps without central backup. Community mechanics could also take more responsibility for repairing pumps, if the right type of pump is installed and they are given the tools and the training. Private sector spare parts distribution is important, as demonstrated by the fact that all the projects already have or are in the process of establishing distribution directly to communities through local retailers.

Source: World Bank, *Seven West African Case Studies of Community Management of Rural Water Supply*, Regional Water and Sanitation Group for West Africa, World Bank, Abidjan, 1991, p. 2.

cost of a delivery system goes up many times when the water requires treatment. The main threat is contamination. Chemical pollution due to industrial waste or bacteriological contamination due to faulty sewerage can create a hazardous public health environment, especially in urban slums. The overuse of pesticides and fertilizers threatens the quality of groundwater in some rural areas. The protection of water sources through public awareness campaigns and appropriate legislation by governments can contribute to the overall cost reduction of water delivery systems in both the short as well as the long term. The cost of environmental damage to the precious resource of water has to be borne by the community immediately or at some point in future.

The optimal utilization of drilling rigs is another area where substantial cost reduction is possible. Drilling rigs represent a high capital investment, and it is common to find that they are underutilized. This occurs as a result not only of lack of a drilling programme but also of failure to plan properly the movement of rigs between drilling sites. Idle time, when a rig is moved a great distance from one site to another, represents a cost; so do the movement of the entire crew, down-time due to non-availability of diesel fuel or rig accessories, lack of readiness at the site due to the tardiness of geological survey, and rig failure due to lack of maintenance. One factor in the lowering of the water supply costs per borehole in Uganda, Nigeria and the Sudan is the optimal utilization of rigs by advance planning and monitoring of their movements.

The major constraint to achieving lower costs in Africa is the current tendency to deploy drilling technology in an extravagant or wasteful manner. Drilling costs are nearly 10 to 15 times costlier than in Asia. The main thrust in the 1990s by all agencies should be reduction in the cost of drilling and reduction in the failure rate of boreholes. In many cases, boreholes drilled for use with a handpump installation are of unnecessarily large

diameter. The cost of drilling could be reduced dramatically if the diameter of the borehole drilled were correct in relation to desired output and appropriate pump installation. The borehole failure rate would also be reduced if more emphasis were placed on accurate, scientific water-source finding based on hydrogeological or geophysical surveys.

One way to standardize and improve operation and maintenance is through devolving certain parts of water supply and sanitation service provision onto the private sector. However, the interest of private companies can only be solicited if sufficient scope is given for their operation, and demand can be relied upon. Trade and tariff policies have to be examined by individual governments, as well as jointly on a regional basis, to create a positive environment for the waterwell industry. Where the political and economic environment is healthy, foreign investment and technology can be attracted. At this time of structural adjustment, African countries would be well advised to introduce liberalized policies towards the water sector designed to bring in foreign capital, promote joint ventures and develop local manufacturing capacity.

The private sector has to be involved in the expansion of water supply services. But to keep costs low and to provide an adequate market for the private sector, its involvement needs management and an element of competition. This is the major organizational and market structure challenge to be considered by the larger African countries. In countries where the government's programme is being implemented through contractors, there is often a) a lack of certainty concerning the market; as a result, private sector investment and its quality is low; b) the size of the market and its structure often leads to few participants, which reinforces monopolistic tendencies; and c) there is a lack of proper control and accountability both of the private

sector contractor and of the government in the implementation of the programme. These factors often contribute to high costs of water supply provision, and they need to be taken into account in devising national and regional strategies.

In summary, the major challenges in rural water supply include:

- Project accountability;
- Assessment of current policies and strategies for cost-effectiveness;
- Sustainability of recurrent costs for operation, maintenance and replacement;
- Optimal use of technology and resources (such as drilling equipment, personnel, hydrogeological surveys, training, contracts with private sector);
- Improved designs for optimal output or maximum use;
- Rehabilitation and recycling of previously used equipment and materials;
- Optimal use of local expertise (including academic institutions, private sector, artisans, community know-how);
- Encouragement of local manufacture (including use of local materials and distribution networks);
- Removal or reduction of import duties and other taxes on supplies needed for low-cost technological approaches;
- Job satisfaction and incentives for planners, implementors and managers to meet cost-effectiveness targets and practise economies of scale.

Urban Water Supplies

While the theme of "small is beautiful" was successfully applied in the rural scenario, hardly any experimentation in appropriate, cost-effective

technology was attempted in water supplies for urban areas. Most of the systems installed are inappropriate and not economically viable. Urban planners in the developing world have imported models of a size and complexity that cannot be operated and maintained by internally generated resources. Most utilities, therefore, rely heavily on government financing. This has precipitated a vicious cycle of service deterioration, an over-absorption of funds by the existing system and major financial constraints on service expansion. The few precious funds available have been used to sustain the existing, dilapidated system for the benefit of the few, while the rest of the rapidly expanding urban population has no service whatsoever.

The waste and leakage in urban water supply is as high as 50%; assets are rarely managed even to the barest minimum level of efficiency. However, a few public utilities have become fully or semi-autonomous—such as those in Côte d'Ivoire, Morocco and Tunisia—and are successfully attracting financing. These experiments have demonstrated that if government gives adequate freedom of operation, major utilities in urban Africa can be converted into efficient and profitable ventures, providing a good service to customers and decreasing the pressure on government resources for the sector.

In the peri-urban areas of Africa the population is expected to multiply many times by the year 2000. Millions of people will find themselves on the city outskirts, providing cheap labour for firms and factories, and living in overcrowded and squalid conditions. Inadequate waste disposal will create environmental and health hazards among people whose social and economic situation is already deprived. There are certain urban African environments where the slum populations spend up to 40% of their income on purchasing water.

No major public health installation should be constructed unless the government or municipality

in question is in a position to pay for all recurrent costs as well as to bear a large part of the initial capital investment. Because this fundamental principle has not been observed, systems have been constructed in urban centres which are not affordable and whose management and maintenance costs cannot be sustained. Only a handful of people gain any benefit from such systems, and all such benefit is short-lived. This approach is in fact not only encouraging disparity in both financial and physical resource allocation within the sector, but is also making the entire sector unreliable. Consumers are only prepared to pay for water supplies if a proper service is assured. Without effective economic and financial management of urban water supplies, the performance of the entire sector is jeopardized.

One possibility for increasing the access of poor urban populations to water supplies is to create water points and allow them to be maintained by private vendors.⁸ The more water points there are, the greater is the competition between manager-vendors; where operation and maintenance is controlled by community cooperatives, the sustainability of the supply can be more or less assured.

In a slum community, water is a strongly felt need, as is illustrated by the high water charges dwellers pay to vendors. Its supply can therefore be a focal point for community organization. The creation of water cooperatives has proved highly successful in parts of Khartoum, where women's groups organize the maintenance of their handpumps and use surplus water for growing vegetables, which they either feed to their families or sell in the market.

In summary, the requirements for effective cost reduction and control are as follows:

- Efficient financial management;
- A planned system of charges to meet current costs;

- Detection of leaks, which contribute to the high cost of many urban water supply systems;
- Sound operation and maintenance with effective quality control of materials;
- Selection of economically appropriate technology in accordance with willingness to pay;
- Where practicable, freedom of private utilities and local cooperatives to manage part of the sector.

Urban and Rural Environmental Sanitation

Sanitation is not merely the construction of facilities, such as latrines, for human excreta disposal. The key to improved sanitary practice in both rural and urban areas is the provision of health and hygiene education to enhance personal convenience, well-being, and lifestyle. The provision of health and hygiene education should be dovetailed with the provision of the appropriate low-cost sanitation technology, raw materials, loan schemes and training so that households and communities can finance and install their own amenities. The task of government and donor agencies is to stimulate demand for sanitation by energetic hygiene education and to set in place an infrastructure for the manufacture of latrine components by local workshops and entrepreneurs. Since a higher proportion of the cost for sanitation than for water supply is borne by communities, it is essential that the costs of materials and manufactured components are kept low and that potential customers and entrepreneurs have access to cheap financing mechanisms.

Sanitation amenities range from a bush privy to a conventional sewer system complete with flush toilets and soft paper. Obviously, the cost varies dramatically from the most basic to the most highly sophisticated installation. It is usually the case that

urban sanitation facilities need to be more durable than rural sites because of the larger numbers of people served. During the Water and Sanitation Decade, a number of appropriate, low-cost sanitation options were developed which proved that population coverage with adequate sanitation facilities is practicable and affordable using local materials and labour. However, more research went into models for use in rural areas than for urban areas. New efforts are required, bearing in mind that the design of sanitation technology for urban areas in Africa will have to take into account planning concepts for the future urban environment.

The key to sustainability of any sanitation technology lies in the availability of cheap materials and the capacity of people to build and maintain amenities. The Ventilated Improved Pit (VIP) latrine has become a standard model for many African environments. Unfortunately, the cost of this model puts it beyond the reach of the poorest African communities. The San Plat, a dome-shaped cement pit latrine slab developed in Malawi, may be more appropriate and affordable for countries such as Ethiopia, where it is currently being demonstrated. There is great need for further research and development on sanitation technology for both urban and rural areas.

Accurate statistics concerning sanitation needs and coverage in Africa are lacking, due to the absence of analysis and monitoring. It has become increasingly apparent that sanitation in urban and peri-urban areas needs to receive more attention, given current urban growth trends and the numbers of people living in overcrowded and squalid settlements, therefore facing health hazards. Environmental sanitation in the rural areas should not, however, be ignored. There are cases where drinking water supplies and the environment in rural areas are becoming polluted as a result of the waste output from urban and industrial sites.

Within an environmental sanitation programme, the main target is attitudinal and behavioural

change. During the past decade, a wide range of health education material has been developed using participatory and interactive methodologies: flip charts, puppetry, street theatre and comedy skits have all been deployed. The mass media, especially television and radio, have also been used for the transmission of health education messages. Experience shows that content and communication strategies need to be geared specifically for the behaviours they are attempting to change. The goal is to create awareness of the relationship between environmental sanitation, personal cleanliness and health, and to generate community involvement by motivating people to utilize services. Unless people are convinced of their value, there is no guarantee that pit latrines will be used and handpump supplies maintained, and that these new facilities will be incorporated into people's way of life.

While in both rural areas and fringe urban settlements low-cost approaches are applicable in the majority of settings, in already built-up and congested urban areas the cost of maintenance and extension of sanitation facilities will be high. Strategies to be used in such settings need close consideration. A new low-cost approach is needed for both solid-waste disposal and sullage, and for waste-water removal. The treatment of waste water and sewage, and their use in semi-urban or downstream rural areas for pisciculture and agriculture, should be promoted. The technical review on *Reuse of Human Wastes in Aquaculture* published by UNDP/World Bank states: "Excreta reuse in aquaculture will become an important form of waste disposal, water pollution control, and food production in the next decade in many parts of the world. Sewage treatment plants and reuse of organic wastes from cities may eventually lead to the development of alternative agriculture systems."⁹ Innovative application of these ideas in Africa would help to tackle sanitation problems and could make a useful contribution to food production and nutrition.

In summary, the strategies for improved sanitation are as follows:

- Continuous health and hygiene education promoting sanitation as a way of thinking and as an integral part of healthy living;
- More research and development on sanitation approaches for urban areas;
- Careful balancing of costs and technologies within adjacent urban areas;
- The promotion of the use of sullage for agriculture;
- Self-financing of sanitary improvements through cheap loans in rural and poor urban areas;
- The availability to potential customers of a variety of models, suited to their means and circumstances;
- There should be government support for training of rural masons in latrine construction and for the marketing and distribution of raw materials and manufactured components.

The Planning Process

The necessity of a national plan and strategy in the safe drinking water and sanitation sector was made explicit by agreements reached at the 1990 World Summit for Children. All governments undertook to prepare national programmes of action to achieve the Summit goals by the year 2000. It was envisaged that all such national plans would involve a variety of partner contributions, from international agencies, NGOs and the community. The following is a check-list of useful characteristics of national water supply and sanitation plans:

- Separate sections for urban, peri-urban and rural areas;
- Feasibility studies, including a full examination of potential ground- and surface-water supplies, the need for conservation and the

need for geophysical investigation and hydrogeological mapping;

- Proposed legislation, where appropriate, for the protection of ground- and surface-water supplies;
- Technological choices (options should be presented for various settings, with their costs, optimal uses and the prospects for future research and development);
- Coverage norms (numbers of installations per capita) should be defined;
- An outline of priorities, in phases, with realistic estimates of investment costs up to the year 2000 (including funding expected from government, donors and community contributions);
- Appropriate implementation and management strategies;
- Fiscal and policy options;
- Guidelines for the role of government agencies, external support agencies, NGOs, communities and the private sector;
- Proposed support for community-based institutions;
- Proposed monitoring system, with methodology for collection of baseline data;
- Training and capacity-building components.

A problem that will be faced by the planners of water supply programmes is the skewed allocation of funds between urban and rural areas. The rapid growth of slum and shanty settlements on the outskirts of African cities will make it impossible to extend urban water supplies and sewerage "profitably" by means of standard modern solutions. The "peri-urban" areas currently represent 60% of the urban population, rising to a projected 70% by the year 2000. With merely 25%-30% of resources, it will not be possible to reach the 70%-80% of the

population in rural and peri-urban areas who are currently unserved or underserved. At present, the service provided to a minority of urban dwellers is being heavily subsidized.

It is commonly supposed that the rural and urban poor cannot contribute to the costs of water supplies and sewerage installations, and that investment in rural and slum areas therefore holds out no prospect of cost recovery. This supposition is misguided. Loan repayments from various rural and poor urban areas have shown that the cost-recovery rate is often better than that from the commercial and industrial sector. If a proper service is provided, the urban poor are prepared to pay back the cost, as seen in the Sudan. In various country settings, revolving loan funds for rural sanitation have been successful.

However, the willingness to pay does not necessarily go with the ability to pay. Particularly in the rural areas, many people are unable to pay for the cost of water sanitation services due to the very low level of rural incomes. But they are prepared to contribute through their labour or in kind to implement, operate and maintain water sanitation services. Efforts should be made to link the drinking water and sanitation projects with rural development and income-generating activities, particularly agriculture or cottage industries. The cost of water should not exceed 5%–8% of the incomes of the poorest households.¹⁰

While planning the sector, it is necessary for the government to make a conscious decision to give adequate importance to these factors, and to oversee the cash flow to rural and peri-urban areas on the one hand, and the modern urban sector on the other. If in cities like Abidjan, Lagos and Nairobi, the users of existing utilities pay back their real costs, the sector will be able to recycle funds into extension projects. Proper pricing and marginal cost recovery for urban

water supply has to be given due attention now in order to prepare for the pressure of urbanization in Africa during the 1990s. This requires a restructuring of the financial management of the sector.

The programme of action should be based on a thorough review of national capacity and need, to which water and sanitation committees at every level of society—from the national to the community level—can contribute. Since resources are likely to be scarce, it is necessary to prioritize target populations, giving first consideration to the vulnerable. The following factors should be taken into account when identifying priority areas for receiving water and sanitation services:

- Is a water-related disease exacting a heavy toll on children?
- In which areas are there multiple water-related diseases?
- Are there places where special interventions are required to deal with conditions such as guinea worm?
- In which areas are repeated drought and water scarcity inhibiting improvement in personal hygiene?
- In which areas is water so costly that people can afford it only at the expense of other basic necessities, such as adequate food for their children?

The external support agencies should provide support to governments in strengthening their planning and monitoring activities. The Uganda Plan for Rural Water Supply, prepared with the help of ESAs, is exemplary, as is that of Botswana. Permanent planning and monitoring cells in the government, as suggested and supported by ESAs, will help to reinforce national capacity in this context.

Monitoring

Effective planning requires reliable data. Effective monitoring requires reliable baseline data. A simple monitoring system is needed to show coverage, served and unserved populations, together with costs and technologies used. An example of such a monitoring system is the Joint Monitoring Programme launched in 1990, an initiative by WHO and UNICEF to build local monitoring capacity at the country level.

In general, monitoring systems should

- Be coordinated at the national level;
- Have a limited number of simple yet measurable indicators;
- Be decentralized as far as possible, down to the community level;
- Assist in capacity-building at all levels;
- Be used actively for effective planning, advocacy and ongoing management.

Costing of Water Supply Programmes

Rural water supplies. Any detailed costing will need to be country-specific since averages across Africa fail to take account of geological and regional factors in the provision of water supplies. Estimates of supply provision vary from US\$5 to US\$75 per capita, although certain donor-assisted projects have shown higher costs in some countries. In estimating the total cost for Africa, diversities in geology, population density and economic circumstances, as well as current levels of sector development and management, have to be taken into account. The African countries have been broadly classified into three groups, High (\$55), Medium (\$30) and Low (<\$20), on the basis of the cost of technology presently being used in rural water supply. (See map on the following page.)

The costs of providing Water for All by the year 2000 on the African continent would amount to US\$14 billion for rural areas, an average annual

cost of US\$1.7 billion from 1993 to the year 2000. If further cost-reduction measures prove practicable, along lines already discussed, it should be possible to reduce the per capita cost to US\$15-\$20. The figures obtained from various projects as well as from the WASH studies conform to this average.¹¹ The detailed figures of water supply costs in Africa for all areas—rural, peri-urban and urban—are shown in Table 5.

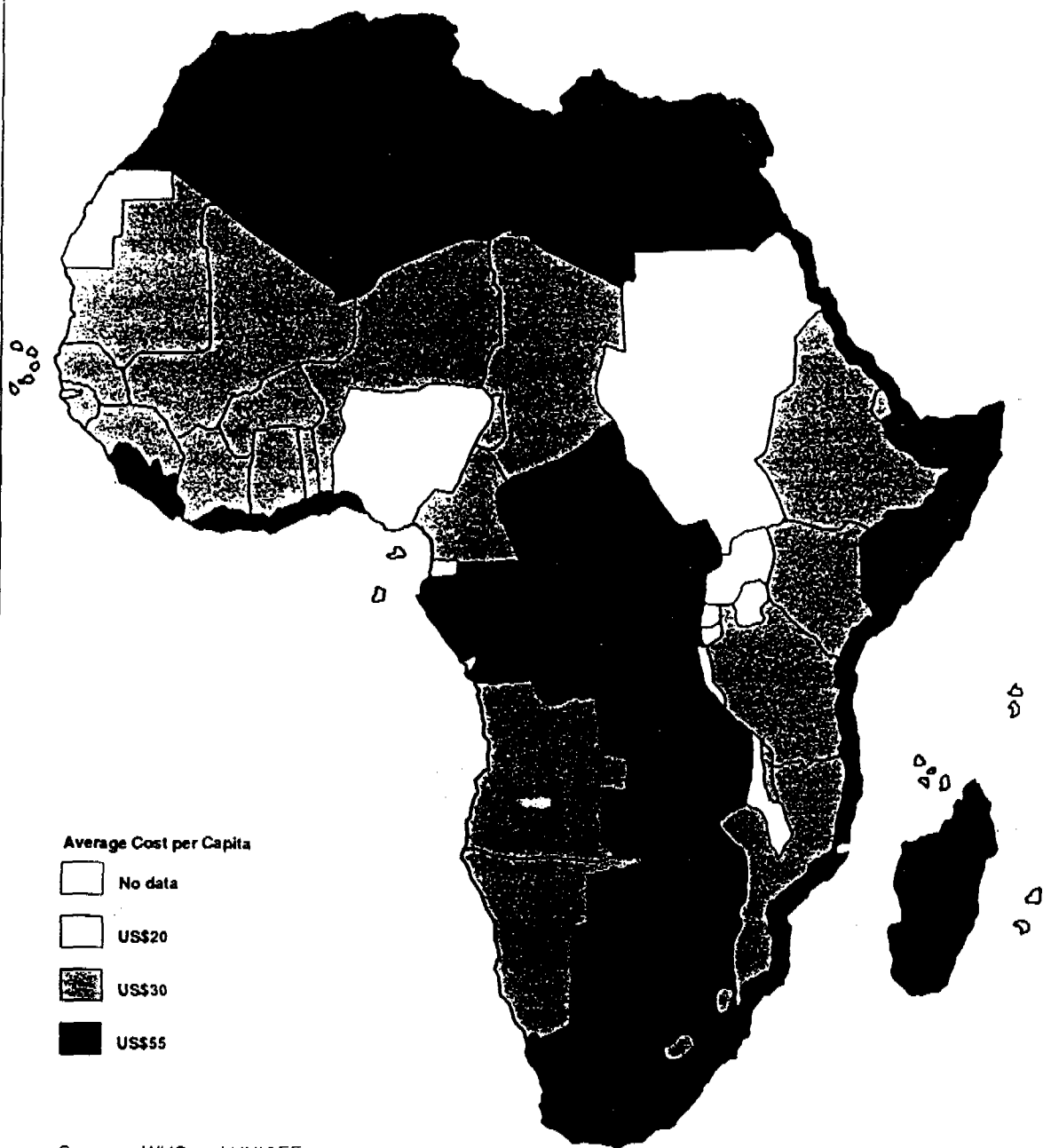
Peri-urban water supplies. Peri-urban areas are more difficult to identify as separate groups and their costs are more difficult to estimate because much depends on the definition of appropriate technology for these areas. One possibility is to extend existing systems into the urban periphery, a solution apparently offering economies of scale; but in practice the work involved in extensions of this kind can be more costly and take far longer than low-cost approaches such as boreholes and handpumps. The handpump option may be the most appropriate medium-term technology for much of contemporary urban Africa. Nearly 30% of the urban population in Asia, opting for quick and low-cost access, is currently served by handpump-boreholes. Conversion to a piped water supply system at a later stage can be considered

Total Cost for Water Supply to the Year 2000

The total cost for water supply for the rural, urban and peri-urban sectors to the year 2000 is estimated at US\$42 billion and for sanitation at US\$34 billion. This amounts to an annual investment of around US\$9 billion per year in the sector over the next eight years.

Concentrating resources on water supply to the rural sector at a cost of US\$1.7 billion per year so as to achieve 100% coverage there would result in total coverage for water supply in Africa by the year 2000 of almost 80%. With some investment in the peri-urban areas the coverage may rise to over 90%. Clearly these are important focus areas for decision-making.

Africa's Rural Water Supply, 1990
Average Cost per Capita



Sources: WHO and UNICEF.

Model for Costing Water Supply in Africa

A. Capital Costs

1. Per capita costs

Rural water supply: Costs have been estimated in the model used in this paper based upon existing capacity and current experiences. Countries were classified in terms of high, medium and low unit costs based on current estimates of cost. (Assumption: one point source serving 250 persons within 1.6 km.)

- High cost @ US\$55 per capita
- Medium cost @ US\$30 per capita
- Low cost @ US\$20 per capita

Peri-urban water supply: The peri-urban population here is estimated at 70% of the total urban population as defined in the United Nations *World Population Prospects 1990*. The total peri-urban population is further subdivided as follows:

- Marginal-urban areas (30% of total peri-urban population) @ US\$200 per capita
(immediate periphery of principal urban area or within it)
- Urban-slums & fringe-urban (70% of total peri-urban population*)
 - Urban-slums @ US\$100 per capita
(*20% of above)
 - Fringe-urban @ Rural water supply costs
(*80% of above)

Urban water supply: The urban population to be served by high-cost modern systems is estimated at 30% of the total urban population as defined in the United Nations *World Population Prospects 1990*. The per capita cost is estimated at \$200.

2. Overhead costs

These costs relate to administration overheads, communications and social mobilization, and contingencies. These have been estimated at 15% of the per capita capital cost.

B. Recurrent costs

Recurrent costs relate to the operation and maintenance of the system. In relation to the total cost of rural water supply for the unserved population these costs are not as significant—about 5% of total capital costs. However, adequate financing of operations and maintenance is an essential requirement in itself, regardless of the status of cost recovery.

through the linking of large borehole sources to the piped water supply network. Furthermore, extension of the piped water supply to peri-urban areas can be planned according to the availability of community financing.

The urban environment is likely to be the recipient, therefore, of a mix of technologies. Those in the marginal-urban areas (i.e., within, or in the immediate vicinity of, the principal urban centre and suburbs) can be serviced with an extension of the piped water supply via high-cost technology. Those slums and settlements that are just outside these areas could be serviced with an intermediate

technology, consisting of pipe-borne water leading to public stand-pipes. Finally, those on the outskirts of the urban areas—the urban fringe—could be serviced by more modest borehole and handpump technology at a lower cost.

Urban water supplies. Water supplies in the principal urban centres and suburbs will continue to be characterized by large modern systems with elaborate pumping stations, complete distribution systems and individual household connections. There is considerable experience in the setting up of these systems and their related costs. However, it is clear that the per capita cost for urban water

Table 5: Estimated Cost of Providing Universal Coverage of Water Supply and Sanitation in Africa by the Year 2000

Sub-sector & Location	Unserviced Population ¹ 1993–2000 Millions	Estimated per Capita ² Cost in US\$	Estimated Capital Cost in US\$ billion	Estimated Overheads ³ in US\$ billion	Estimated Recurrent Cost ⁴ in US\$ billion	Estimated Total Costs in US\$ billion
Water Supply						
Rural	348	32	11.13	1.67	0.55	13.35
Peri-Urban ⁵	130	95	12.35	1.85	0.62	14.82
Urban	56	200	11.20	1.68	0.56	13.44
Subtotal (A)	534	—	34.68	5.20	1.73	41.61
Sanitation						
Rural	417	10	4.17	0.62	0.20	4.99
Peri-Urban ⁵	134	25	3.35	0.50	0.16	4.01
Urban	58	350	20.30	3.04	1.01	24.35
Subtotal (B)	609	—	27.82	4.16	1.37	33.35
Total Water (A) and Sanitation (B)	—	—	62.50	9.36	3.10	74.96

Notes: ¹ Population projections reference: *World Population Prospects 1990*, United Nations; water and sanitation coverage figures reference: WHO/UNICEF 1990 Statistics.

² Estimated per capita costs extrapolated from 1990 UNDP/World Bank and UNICEF estimates.

³ Estimated overhead costs relating to administration, communications and social mobilization—15% of capital costs.

⁴ Estimated recurrent costs relating primarily to operations and maintenance—5% of capital costs.

⁵ Peri-urban population is assumed to constitute 70% of the total urban population.

supply is increasing rapidly, and this area is demanding more investment to improve the coverage for fewer people.

Costing of Sanitation

While strategically the major focus should be on water supply, the cost of providing rural, urban and peri-urban sanitation cannot be left out of consideration. Sanitation, as noted earlier, is less a commodity than a set of behaviours, and the key policy for rural areas should be the provision of health and hygiene education. This should be done in conjunction with training in low-cost appropriate technology for masons, provision of raw materials, the establishment of cheap financing mechanisms, and the encouragement of local manufacture and installation of latrine components. For urban areas, low-cost approaches and models can also be developed. For example, in low-income areas of Accra, Ghana, voluntary organizations and local entrepreneurs operate community latrines, and the municipal authorities are responsible for disposing of wastes.¹²

The main cost for the government and donor agencies will be in imparting health and hygiene education, establishing infrastructure for the manufacture of sanitation components, including the encouragement and training of entrepreneurs, and in setting up credit facilities so that private sector manufacturers and potential household customers can obtain financing through cheap loans. When computing costs, however, the total cost to the community needs to be estimated. Estimates based on the use of VIP latrines in rural areas indicate costs of US\$10 per capita. Peri-urban sanitation costs are estimated at US\$25 per capita and those for urban systems at US\$350 per capita. As in the case of water supply, the overheads are estimated at 15% of these per capita costs, and recurrent costs are estimated at 5% of total capital costs.

Mobilizing Resources

National Resources

Out of the US\$15 billion spent in the water and sanitation sector in Africa in the last decade, it is estimated that only 30% was generated by the countries themselves. Out of these resources, not more than 10% was spent in rural areas, leaving these populations to external donor assistance or self-mobilization. While external assistance to boost activities in rural areas must continue for at least this decade if the goals of Water and Sanitation for All are to be achieved, internal resource mobilization is essential. The rural and peri-urban areas deserve a larger share of national resources for water and sanitation, and systems in the principal urban areas which involve household connections should depend increasingly on cost recovery and self-generation of resources.

Additional internal resources may also be mobilized by issuing water bonds or national certificates for specific water projects; rural banks may also be able to contribute by providing soft loans for water supply and sanitation projects. But this cannot substitute for the allocation of more resources in the national budget for the promotion of water supply in rural and peri-urban areas. These resources are needed to support the delivery system of spare parts, the purchase of capital equipment, training, capacity building, infrastructural development, and research. A 1987 study undertaken by Daniel Okun for WASH suggested that funding for the promotion of water supplies in underserved areas should be initiated by government, and then receive additional support from external donor agencies.¹³

While the installations undertaken by the water supply sector in rural and peri-urban areas require intervention and initial funding from

government, those undertaken in the sanitation sector should be almost entirely financed by communities and consumers. With an increased range of low-cost technology, trained manpower, soft loans and demonstration projects, the sector ought to be self-generating. While government should support health education campaigns and facilitate the development of infrastructure, as already described, the actual installation of amenities should be carried out by the people themselves. The establishment of revolving loan funds should generate resources and help promote demand. A properly planned programme can even create employment and an indigenous rural industry, so that masons and entrepreneurs themselves become educators and mobilizers.

The following strategies should be applied for mobilizing additional national resources for water and sanitation:

- Additional allocations to the water and sanitation sector within national development budgets;
- More equitable allocation of government resources to the rural and peri-urban areas;
- Increased community participation as a contribution to full operation and maintenance;
- Full cost recovery for major service installations for water supply and sanitation in urban areas (through the collection of water rates or taxation);
- Cost-reduction in the areas of management and maintenance;
- Higher taxes on imported technology and equipment for high-cost urban technologies.
- Tax relief from excise or import duties for water supply and sanitation parts for intermediate and low-cost technologies;

- Encouragement of local entrepreneurship, particularly for urban and rural sanitation;
- Provision of low-interest loans for water and sanitation (through credit unions, rural banks, etc.);
- Support to health education, research and development, and demonstration projects.

International Resources

International assistance to water supply and sanitation in Africa has been piecemeal and generally uncoordinated, resulting in non-standardized technologies with problems of long-term sustainability. Little attention has been paid to the need to build up local capacities while increasing the coverage of services. Poor collaboration within the donor community and between governments has resulted in a duplication of effort and waste of scarce resources.

International support is supposed to assist national plans which are determined and coordinated by governments. In fulfilling this role, the following may be encompassed:

- Support government in its efforts to coordinate all water supply and sanitation activities;
- Assist in technical cooperation between developing countries (TCDC), including TCDC in local capacity building;
- Support government by providing additional funding (including loans on concessionary, or soft, terms) to programmes that incorporate cost-effective approaches, systematic monitoring and community participation;
- Explore with government the provision of innovative small-scale funding, including loans to individual communities, revolving loan funds, and matching fund programmes among government, donors and communities.

- Support governments in organizing training and exchange visits to develop human resources in the sector;
- Support in monitoring, evaluation, research and development.

In the near future a clear commitment and increased allocation of external resources is necessary to sustain activities in the sector. A significantly higher donor commitment over the next three to four years, with specific focus on cost-effective approaches, systematic monitoring and projects based on community participation, would boost activities in the sector. "Donors can make loans or grants which, with establishment of revolving funds, can help ensure long-term viability of the WS&S programs."¹⁴

Conclusion

There can be no doubt about the important role of the water and sanitation sector in helping to generate sustainable development and economic growth in Africa. Interventions such as those described in this paper can bring an overall improvement to the condition of the poorest of the poor, and to their children, and should therefore be a priority for national and global planning.

There has been in Africa a pattern of repeated drought and calls for short-term emergency relief measures to provide water and sanitation facilities for displaced populations. These interventions require high-cost, non-sustainable investment. Instead, a mid-term and long-term strategy based on low-cost approaches is required; this would have the additional benefit of improving the environment and the quality of human life, especially that of women and children. These services can enhance the efficacy of basic education and nutrition, improve overall health standards and initiate fundamental capacity building and community organization.

NPAs to meet the goals established by the 1990 World Summit for Children are major steps in endorsing the goals of universal access to safe water and sanitation. Under the leadership of national governments, and with donor support, the following action plan may be considered:

- Preparation of an environment-friendly national water supply and sanitation policy framework, with set objectives;
- Formation of a government-led national Committee for Safe Water Supply to provide a coordinating mechanism at the policy level which ensures that all organizations active in the sector, including NGOs and ESAs, follow the same national policies in pursuit of the same objectives;
- The preparation of a National Water and Sanitation Plan (NWSP) which considers:
 - Evaluation of existing policies
 - Community participation, including women's roles
 - Decentralized water and sanitation programmes
 - Cost-effective methodologies
 - Low-cost and intermediate technologies
 - Standardization (equipment, supplies, technologies)
 - Cost-recovery elements, including innovative financing
 - Baseline data, monitoring and evaluation
 - Capacity building at all levels
 - Focus on priority areas
 - Inter- and intrasectoral coordination (with health, education, nutrition, etc.)
 - Private sector involvement;
- Develop a decentralized support structure to provide assistance to communities;
- Prepare a pipeline of projects to match the national water and sanitation objectives;

- Strengthen and plan human resource development in the sector with the support of external agencies and to reinforce the relevant institutions;
- Develop policies and activities to increase self-reliance in the sector;
- Improve subregional coordination and cooperation.

Monitoring and evaluation must be an integral part of any programme so that mistakes are not repeated and lessons fully absorbed from the implementation experience; this will increase efficiency of the sector.

Over the eight-year period 1993–2000, an average of US\$5.2 billion for water and US\$4.2 billion for sanitation will be needed, of which US\$3.5 billion and US\$1.1 billion respectively

Table 6: Annual Average Costs and External Support Agency (ESA) Funding Required for Different Levels of Coverage to the Year 2000

Sector	Target Percentage Coverage to 2000	Rural and Peri-urban		
		Annual Average Cost US\$ billion	Funding US\$ billion	
			ESAs	Domestic
Option 1				
Water Supply	100	3.5	1.8	1.7
Sanitation	100	1.1	0.5	0.6
Total		4.6	2.3	2.3
Option 2				
Water Supply	95	3.2	1.6	1.6
Sanitation	80	0.8	0.4	0.4
Total		4.0	2.0	2.0
Option 3				
Water Supply	80	2.3	1.2	1.1
Sanitation	75	0.7	0.3	0.4
Total		3.0	1.5	1.5

Explanation of funding proposal:

1. The options differ in the target coverage levels and the consequent resource requirements.
2. As suggested in the paper, the proposal is that ESAs provide 50% of the financial requirements for rural and peri-urban water supply and sanitation. The cost of sanitation for these areas would be borne largely by the communities themselves. The government would be a promoter/facilitator/catalyst through the provision of infrastructure, training of masons, supply of raw materials, education and loan facilities at subsidized rates. ESAs could provide funds for demonstration projects, training, education and research and development. NGOs will play a catalytic role in the promotion of water supply and sanitation. With the application of proper policies and effective monitoring it should be possible to reduce the costs substantially.
3. The annual average cost of urban water supply and sanitation is estimated at: \$4.8 billion for Option 1; \$3.5 billion for Option 2; and \$2.7 billion for Option 3. Financing of urban water supply and sanitation is not part of the package discussed for ESA support in this paper. It is anticipated that financing for this area would be primarily through better cost recovery and sectoral loans.

Source: Cost and Economics Unit, UNICEF, New York.

would be for low-cost systems. It may be assumed that half of this would be provided by governments and communities and the need for external support would be around an additional US\$2.3 billion per year. (Table 6 provides various options.)

Needed: A national plan in which all partners can invest; coordination between partners to secure a standardized approach in design and technology; convergence between emergency and development projects; integration between sectors to achieve holistic benefits from water and sanitation interventions; low-cost technologies that can be sustained by user communities; involvement of women at all stages of programme development; renewable energy to preserve the environment; monitoring as a management tool and to record coverage. And, through the adoption of these common sense strategies developed as a result of hard-won experience, optimization of scarce resources.

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