

# Chapter 23

## Water and Sanitation

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## 23.1 Introduction

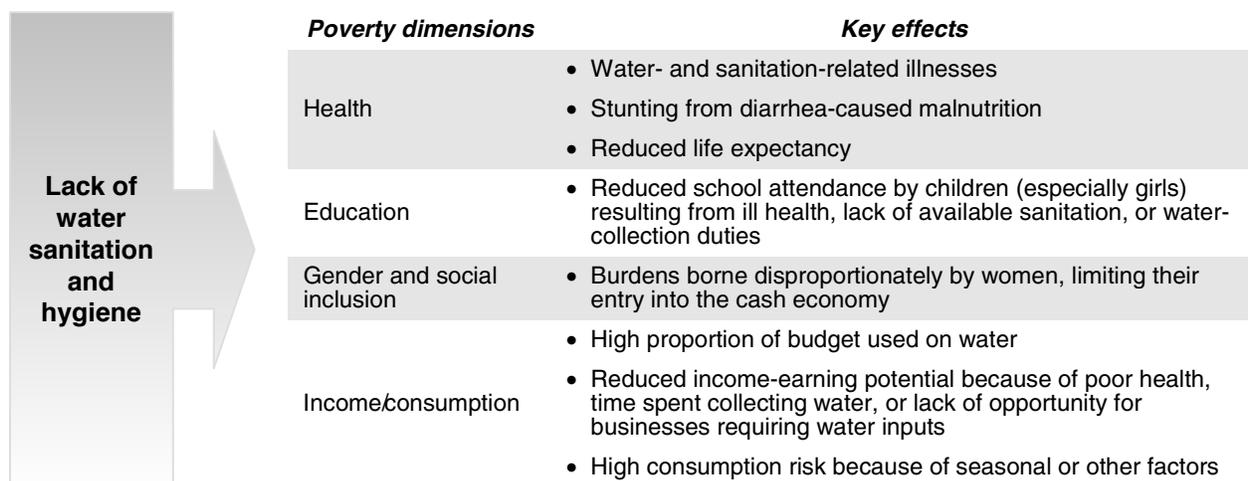
Approximately 1.3 billion people in the developing world lack access to adequate quantities of clean water, and nearly 3 billion people are without adequate means of disposing of their feces. An estimated 10,000 people die every day from water- and sanitation-related diseases, and thousands more suffer from a range of debilitating illnesses. The impact of inadequate water and sanitation services falls primarily on the poor. Badly served by the formal sector, the poor make their own, often inadequate, arrangements to meet basic survival needs. Many fetch water from long distances or end up paying high prices to water vendors for very small quantities of water.

The clear need for basic water and sanitation services for the poor assumes even greater significance when the linkages with other dimensions of poverty are considered. Water- and sanitation-related sicknesses put severe burdens on health services and keep children out of school. Human waste poses a tremendous social cost through pollution of rivers and groundwater. Figure 23.1 shows how lack of water and sanitation affects poverty through these and other linkages.

Despite significant investments in the sector in recent decades made by governments, nongovernmental organizations (NGOs), bilateral and multilateral agencies, and the private sector, the outlook for access to safe and adequate supplies of water and environmentally sustainable sanitation remains grim. Coverage varies substantially by country, but well over one-third of rural populations in most lower income countries lacks access to safe water or sanitation. This is despite water being consistently identified as a basic need and a top priority by those who lack convenient or affordable access to it. National indicators on access to safe water and adequate sanitation are compiled by the United Nations (see technical note S.1).

Lack of access arises both from income shortages and the specific cultural, economic, regulatory, and institutional environment prevailing in the country in question. An urban household located in an informal settlement may not be connected to the piped water system because it does not have the property rights to the land it occupies, preventing the utility from building fixed assets on illegally inhabited land. Among the rural or urban poor, lack of a political voice may prevent their needs from being heard by those in charge of allocating the funds earmarked for water supply and sanitation improvements. In other situations, it may be man-made pollution of water bodies and aquifers that limits easy and less costly access to safe water resources. Without major consumption sacrifices, the poor cannot afford the costs of treatment and the technologies that extract water from deeper aquifers. Although both poorer and higher income segments of the population may face the same polluted resources or inadequate services, higher income households can afford private solutions to these problems—solutions too expensive for the poor population.

**Figure 23.1. Linkages between Poverty and Water and Sanitation**



This chapter describes possible elements of a contribution by water and sanitation to a national Poverty Reduction Strategy. It highlights the pathways through which water and sanitation services influence poverty status. And it stresses the importance of understanding exactly how the poor use water and sanitation services, and the fact that among the poor such use may vary by region and by rural, town, and urban status, in addition to gender, ethnicity, and depth of poverty. In this complex environment, devising an effective strategy that reaches the target groups will require consultation with those groups.

Everyone, no matter what their poverty status, has water and sanitation services. But service levels vary tremendously, even within the broad category of the poor. Some differences in service levels, such as supply pressure, are matters of convenience, but others, such as pathogen loads in drinking water or latrines to isolate feces from human contact, fundamentally affect the health, education, and other attributes that exacerbate or ease poverty. A Poverty Reduction Strategy will focus on the latter aspects of water and sanitation service.

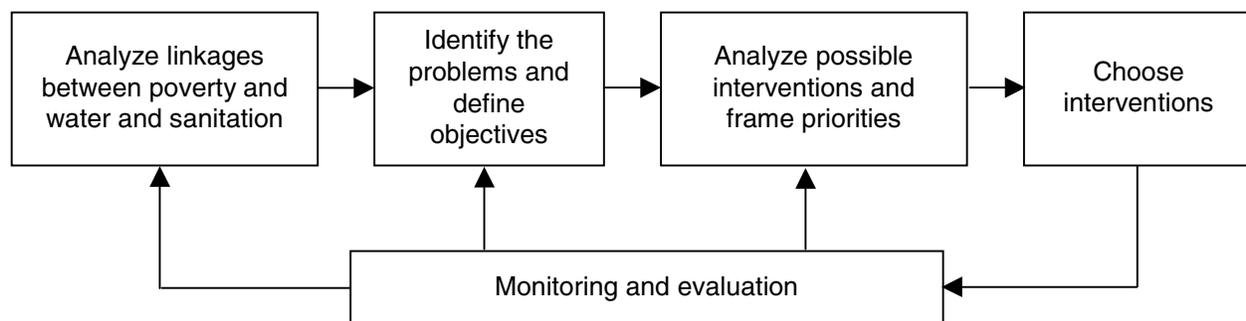
Most rural people and, in most countries, the bulk of the urban poor rely on private provision to meet their water and sanitation needs. Indeed, recent evidence strongly indicates that publicly provided water and sanitation services repeatedly fail to provide efficient service or reach the poorest segments of the population. Any water and sanitation strategy will need to recognize and be built around the centrality of private provision.

The chapter, therefore, recommends an approach to a water and sanitation strategy that first concentrates on providing a strong, supportive policy environment for existing private service provision. One important government role may be the establishment of microcredit or other arrangements that avoid unsustainable subsidized services yet facilitate improvements demanded by the poor. Where direct government provision and management of networked water services or standpipes continues, the chapter recommends immediate assessment of service efficiency, measured against national and international benchmarks, to determine efficiency levels. It would be unlikely that a forward-looking strategy would depend on further expansion of direct government service provision; it would rather seek means of increasing the competitive pressure on existing services.

This chapter aims to assist policymakers and sector departments in their design of water and sanitation strategies that actively address the needs of the poor. The structure is as follows. Section 23.2 provides guidance on analysis of the linkages between poverty, water, and sanitation; section 23.3 helps the reader to identify problem areas that require intervention, and to define objectives; section 23.4 goes on to provide a menu of possible public interventions and a framework that assists in their prioritization; and, finally, section 23.5 sets out a monitoring and evaluation framework that allows reevaluation of the linkages, appraisal of poverty outcomes, and assessment of whether the chosen intervention has been effective.

A successful strategy will adapt to new understanding and new circumstances. For this reason, an element of the Poverty Reduction Strategy will be a monitoring and evaluation program that provides continuous feedback on what is working and what is not. This chapter concludes with a recommendation for monitoring and evaluation programs built on heavy participation by the poor themselves. This is summarized schematically in figure 23.2.

**Figure 23.2. Approach for Sector Strategy**



## 23.2 Poverty, Water, and Sanitation: Understanding the Links

Inadequate water and sanitation services to the poor increase their living costs, lower their income-earning potential, damage their well-being, and make life riskier. The continuing, nearly universal deterioration of the surface and underground water sources on which people survive means that water and sanitation pressures will simply become worse in the future.

This section seeks to improve understanding of the impact of the lack of water and sanitation on different poverty dimensions. Once the impacts are known and their relevance assessed in a given community or country, priorities for intervention can be decided.

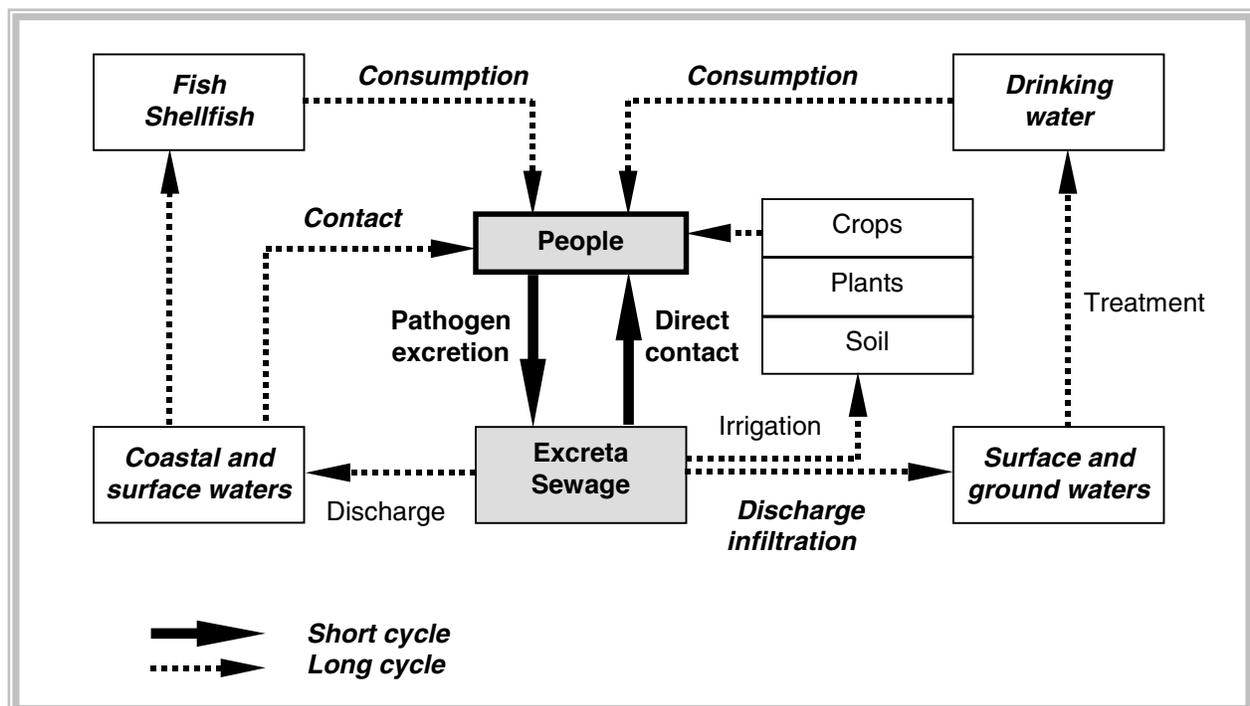
### 23.2.1 Health effects

The classical mechanisms of transmission of waterborne diseases are poor personal hygiene, described as the “short cycle” (excreta -> hand -> mouth), and environmental pollution, described as the “long cycle.” Figure 23.3 highlights these cycles. Typically, physical investments in community sanitation most effectively break the long cycle. Breaking the short cycle requires changes in personal behaviors and practices, which present a more difficult challenge.

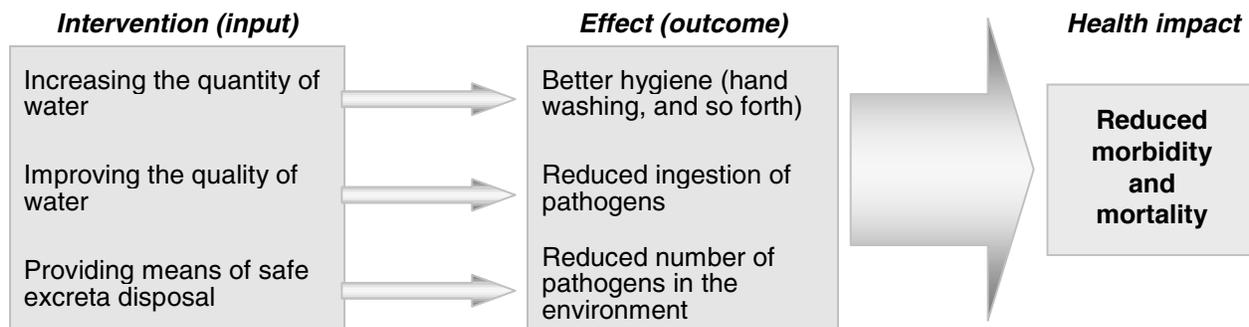
Diarrhea accounts for nearly 30 percent of the burden of childhood communicable disease, with an estimated 2.2 million child deaths annually and a much larger number of children (and adults) suffering from illnesses. Repeated bouts of diarrhea contribute to malnutrition. Water and sanitation—and hygiene—are intimately related to diarrheal diseases. The interactions are complex, but adequate quantities of water, even low-quality water, are necessary if people are to adopt the hygienic habits needed to break the disease transmission pathway.

Just as everyone needs water daily, everyone, rich and poor, defecates and urinates daily. But where that takes place has a significant impact on family health. Households with private toilets have measurably lower morbidity rates than households without. Private toilets benefit not only the household but also neighbors who gain protection from the household’s feces. The poor and their neighbors often lack

**Figure 23.3. The Main Pathways of Human Exposure to Pathogens in the Aquatic Environment**



**Figure 23.4. Effects of Water and Sanitation Interventions on Health**



private toilets, forcing defecation in public spaces, and leaving them more vulnerable than the nonpoor to communicable diseases.

Figure 23.4 shows the key channels through which physical improvements of water and sanitation services influence health outcomes. The provision of hygiene education, in addition to the physical interventions, helps ensure that feces are safely disposed of, hand washing is done properly, and water is stored safely.

Additionally, inadequate water and sanitation infrastructure slows other health improvements. With regard to sanitation, women often have different privacy requirements than men. When the absence of latrines forces them to use public spaces, they can do so only in the shelter of darkness, during early morning and late evening hours. One response is urine retention, which leads to health problems. From the community perspective, the adequacy of drainage plays a large role in health outcomes. Where drains do not exist, or are blocked, and wastewater stands in the streets, children are particularly vulnerable to disease transmission through direct contact. The standing water may also serve to host other disease vectors, such as mosquitoes transmitting malaria and other diseases. See chapter 18, “Health, Nutrition, and Population,” for further discussion on the impact of infrastructure on health outcomes.

### 23.2.2 Effects on education

In some cultures the lack of toilets in schools serving the poor is known to be a major factor in deterring girls from continuing their education, particularly after puberty. In these cultures, private toilets (if only latrines) and even the availability of drinking water provide a necessary condition to reach school enrollment goals (see box 23.1).

Children—particularly girls—are often required to help their mothers with the time-consuming task of fetching water, as box 23.2 illustrates by the story of Elma Kassa from Ethiopia. Fetching water has been found in many countries to reduce children’s time for schooling or playing.

Chapter 19, “Education,” provides further details on the effects of education on poverty outcomes.

#### Box 23.1. Girls, Sanitation, and Education

Reasons for low female school enrollment and attendance related specifically to the water supply and sanitation sector include inappropriate school sanitation or total lack of toilets or latrines, lack of water, and lack of privacy. The following examples illustrate this point:

- In Bangladesh many schools do not have any latrines, although it is recognized that latrines are important not only for health protection but also for the school attendance of girls.
- In the Rohtas district of Bihar State in India, only 59 percent of schools have drinking water facilities and 11 percent have toilets. A study undertaken in this district suggests that to enhance the enrollment of girls it is necessary to motivate the parents and the girls themselves. Key motivating factors include providing midday meals and free learning materials and aids and constructing drinking water and toilet facilities.

Source: Adapted from *Gender in Education and Training for Water Supply and Sanitation: A Literature Review*. International Water and Sanitation Center (IRC). 1997. Unpublished.

### Box 23.2. The Lifestyle of a Young Girl in Ethiopia

Elma Kassa is a 13-year-old girl from Addis Ababa, Ethiopia. Her father is a laborer and her mother is a washer-woman. She has one younger sister and a brother.

“I go to collect water four times a day, in a 20-litre clay jar. It’s hard work! When I first started collecting water, I was about seven years old. In those days we used to have to walk for over a mile to fetch water. Now there is a tapstand about 10 minutes away from my home, which has made life easier. I’ve never been to school, as I have to help my mother with her washing work so we can earn enough money. . . . Our house doesn’t have a bathroom. I wash myself in the kitchen once a week, on Sunday. At the same time I change my clothes and wash the dirty ones. When I need the toilet, I have to go down to the river in the gully behind my house. I usually go with my friends as we’re only supposed to go after dark when people can’t see us. In the daytime I use a tin inside the house and empty it out later. If I could alter my life, I would really like to go to school and have more clothes.”

Source: DFID (1998).

### 23.2.3 Gender and social inclusion

Groups such as female-headed households, the elderly, and ethnic minorities are disproportionately poor, and among the poor they tend to be most adversely hit by a lack of water and sanitation services. The voices of these vulnerable poor groups may be neglected when such services are established. Even when they are the primary managers of household water, women are often not included in public decisionmaking processes concerning water and sanitation services. Geographically dispersed poor groups (often ethnic minorities) may be excluded in the process of setting up community water and sanitation services. Situations in which marginalized groups are excluded from wider community decisionmaking activities will lead to continued use of unsafe water as well as limited access to existing or future services by these same groups.

Furthermore, a lack of adequate sanitation will endanger girls and women in those cultures where they have to wait until the evening to be able to defecate and urinate. The health consequences have already been mentioned, but security issues also arise as women and girls are more vulnerable to violence, sexual harassment, and other types of crime during the hours of darkness.

### 23.2.4 Effects on income and consumption

The lack of water and sanitation infrastructure has complex effects on consumption patterns, which significantly influence people’s overall well-being. Figure 23.5 shows these effects, which are discussed in more detail in the subsequent paragraphs.

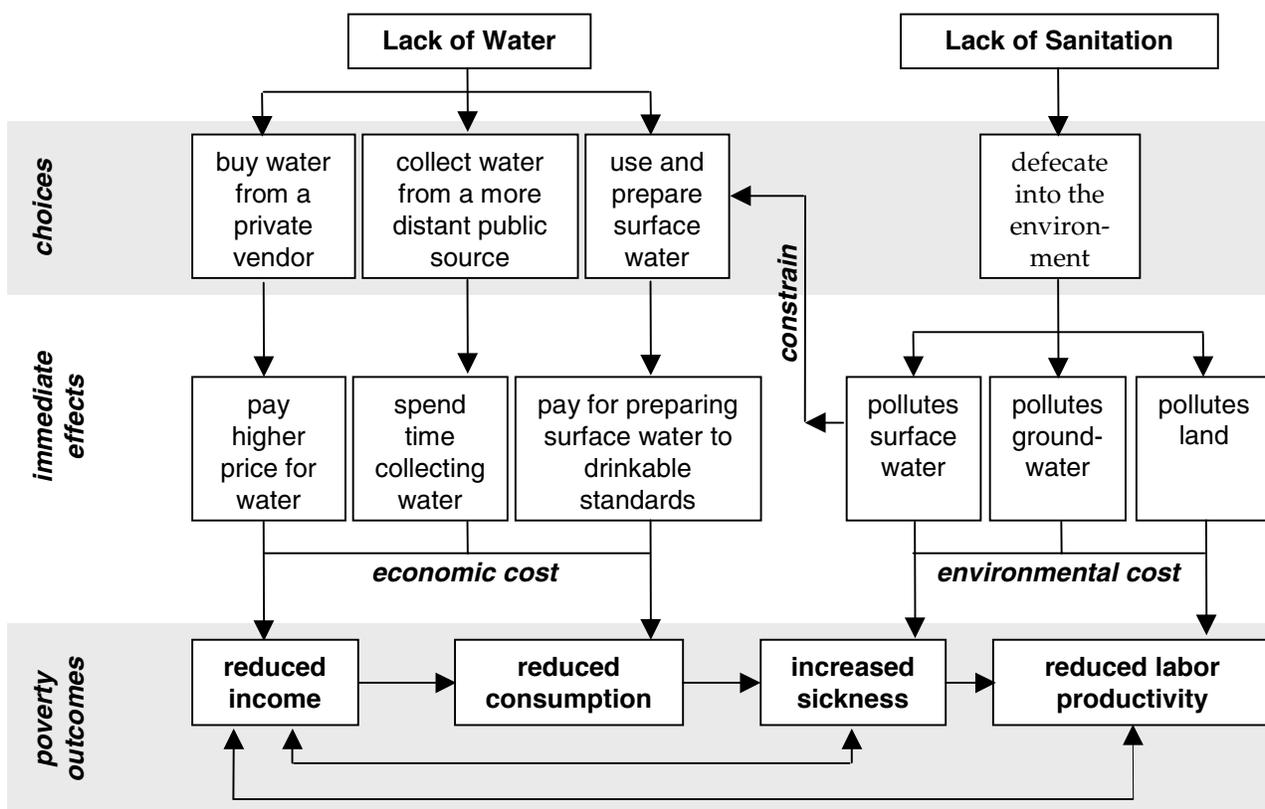
*The economic cost of water.* Traditional poverty measures focus on income, but the rural and urban poor may face higher costs for water in addition to lower incomes. The lack of network water connections for the urban poor, or of any water service for the rural poor, typically leaves them buying from water vendors at high per liter prices (see box 23.3), waiting in long lines at or walking long distances to public sources, and incurring additional costs for storing and boiling water.

The lack of convenient and affordable access to water reduces a poor household’s consumption of other commodities and services, leaves it consuming less than the optimum amount of water for good hygiene, and impacts health and labor productivity of the household members. It may also reduce income-generating opportunities of the household, thereby further reducing income and consumption.

The World Health Organization has established a norm of 20 liters per capita per day (lcd) for water use to satisfy basic personal and hygiene requirements. Of that amount, about 10 lcd serve drinking and cooking needs, while the remainder goes to bathing, particularly hand washing. When water is expensive, either in cash terms or in the time and energy needed to collect it, the poor often cut total consumption to 15 lcd or less and cut back on bathing.

A number of studies have shown that the volume of water collected varies little for water sources from about 30 to 1,000 meters from the house. For sources closer than 30 meters, usage increases, and for more than 1,000 meters, usage falls. Figure 23.6 shows this experience in terms of minutes required for a return trip to the water source. Distance matters, but so does queuing time. If users can walk 10 meters to

**Figure 23.5. Consumption and Income Effects**



a standpost but then must wait an hour before use, they will collect no more water than someone traveling 200 meters to a standpost who has no wait in line.

*The environmental cost.* Threats to water sustainability arise in both quality and quantity dimensions, driven by pollution and competing demands from many sectors, including industry, agriculture,

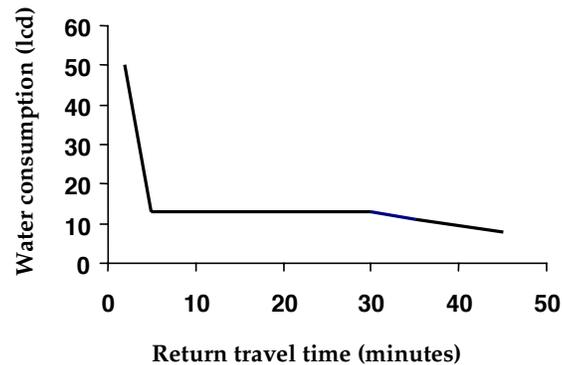
**Box 23.3. How Much Do the Poor in Urban Areas Pay for Water**

The problem of lack of water services hits the poor in the slum areas of the large cities in developing countries. Often the only choice for low-income households that cannot afford a house connection is to buy water from private vendors at a relatively high price, sometimes 100 times more than that provided by public authorities. Examples are shown in the following table:

**Ratio Between Prices Charged by Vendors and by Public Utilities**

<i>Country</i>	<i>City</i>	<i>Ratio</i>
Bangladesh	Dacca	12-25
Colombia	Cali	10
Ecuador	Guayaquil	20
Haiti	Port-au-Prince	17-100
Honduras	Tegucigalpa	16-34
Indonesia	DKI Jakarta	4-60
Surabaya	20-60	
Ivory Coast	Abidjan	5
Kenya	Nairobi	7-11
Mauritania	Nouakchott	100
Nigeria	Lagos	4-10
Onitsha	6-38	
Pakistan	Karachi	28-83
Peru	Lima	17
Togo	Lome	7-10
Turkey	Istanbul	10
Uganda	Kampala	4-9

Source: R. Bathia and M. Falkenmark. 1993. "Water Resource Policies and the Urban Poor: Innovative Approaches and Policy Imperatives." *Water & Sanitation Currents*. United Nations Development Program–World Bank Water and Sanitation Program.

**Figure 23.6. Water Consumption versus Travel Time**

Source: DFID (1998).

and energy. Environmental degradation reduces labor productivity by contributing to the increased burden of diseases and by limiting income potentials (especially in aquaculture).

Nationally, dwindling availability of clean water per capita will increase the economic cost of water and, in a situation of scarcity, limit the potential for economic development. Locally, communities that fail to protect their surface and ground waters from pathogens have fewer options for drinking water and require more expensive technologies for extracting water from deeper aquifers or for treating surface water to drinkable levels. In the urban context, where water may be supplied from a utility, increasing costs of extraction or treatment are passed on to consumers through higher prices (see box 23.4). The poor have fewer resources; Hence, they disproportionately suffer the consequences (see chapter 11, “Environment,” for further details).

**Water, sanitation, and risk.** Inadequate water and sanitation services can bring with them a particular risk in each of the dimensions already described. And water availability and quality may both be highly seasonal. During the dry season, the urban poor face higher water prices, while the rural poor face longer treks for lower quality water. Moreover, sewage return flows to water bodies, bearing pollutants of various types, make up a bigger proportion of total flows, reducing water quality and making effective treatment more difficult. The risk is faced in household consumption and in the use of water in economic activity such as agriculture. The poor are particularly unequipped to cope with this risk, since coping requires expensive storage or additional treatment. During the wet season, inadequate drainage and other sanitation infrastructure becomes problematic, as overflowing polluted water may stand in the streets for long periods.

#### **Box 23.4. Degradation of Water Quality and Implications for the Cost of Water in Indonesia**

In addition to causing environmental damage, water pollution and excessive pumping have effects on the cost of water. To improve water quality, amounts of (often costly) chemicals must be increased. For example, to treat the increasingly polluted raw water entering the Pulogadung water treatment plant in Jakarta, chlorine was increased from an average of 2.6 mg/l in 1982 to about 7 mg/l in 1984. This increase raised treatment costs by Rp 610 million per year (1985 prices) and decreased plant efficiency by 18 percent (Rp 870 million per year). The “finished” drinking water frequently was off-color and exceeded limits for concentration of ammonium, organic matter, and fecal coliform. Another negative long-term effect of high chlorine use is production of chloroform and other carcinogenic residues.

Another large cost of the bacteriological contamination of raw water is that of boiling water to make it potable. The high levels of pollution and the poorly operated treatment and distribution facilities make the public water supply undrinkable unless boiled before use. For the Jakarta special capital province area, this cost has been estimated at Rp 96 billion (1987 prices) or US\$52 million per year, equivalent to 1.1 percent of the gross domestic product then generated in Jakarta. A survey conducted in Jakarta showed that a household boils about 4.4 liters of water per capita per day, whatever the water source. Boiling water for between 15 and 20 minutes cost about Rp 7.5 per liter.

Source: R. Bathia and M. Falkenmark. 1993. “Water Resource Policies and the Urban Poor: Innovative Approaches and Policy Imperatives.” *Water & Sanitation Currents*. United Nations Development Program– World Bank Water and Sanitation Program.

### 23.3 Assessing the Problem and Defining Targets

The previous section highlighted potential impacts of inadequate water and sanitation on poverty outcomes. This section provides ideas on how to move from those general concerns to identification of specific poverty-related water and sanitation problems, and how to use that information to decide on sector strategy goals.

The section proposes a sequential approach to determining sector strategy goals. It would begin by taking stock of current government water and sanitation sector policies to determine whether they are designed to respond to the needs of the poor. That review would be followed by a reexamination of national experience with the links between poverty and water and sanitation services, seeking to answer whether the lack of adequate service causes disproportionate problems in areas such as health and education or whether impacts are balanced across the dimensions of poverty. Information on the poor themselves and their perceptions of water and sanitation needs should then be examined. Efforts to meet those needs are likely to face a number of constraints—some social, others political—which are then discussed. Finally, with this background, the section suggests an approach to incorporating the information to develop a sector strategy better targeted to serve the needs of the poor.

#### 23.3.1 Taking stock of government policies

Repeated national and international campaigns for improved water and sanitation have left most countries with clearly stated policy goals for coverage or service levels. The challenge in a Poverty Reduction Strategy is to reexamine those goals for their impact on the poor and to reorient them as necessary. For instance, one goal might be universal availability of house connections. While arguably a desirable objective, it might encourage use of public money to increase urban connections at the expense of closing a much larger rural gap in safe water supply. A campaign to increase high-quality latrine construction through matching grants to households would likely focus sanitation support on the nonpoor. Clearly, the starting point for reexamining government policy objectives will be the existing government strategy and budget allocations for the sector.

Some key questions that could guide the review of the existing policy objectives are the following:

- What is the government commitment to formulate pro-poor policies in this sector?
- What are actual government priorities within the sector: extending access to those who do not have services, improving current service delivery to customers, or a combination of both? Who is the target group under each option?
- Are there any ongoing government reform efforts that might affect service delivery, such as government decentralization or market liberalization?

#### 23.3.2 Identifying priority areas: spatially and thematically

The proposed approach to identifying priorities is to map the income poor and the water and sanitation poor, looking for areas that promise high-return interventions. Restricting the focus of public interventions to deprived rural regions, or to slums and informal urban settlements, may enhance the poverty targeting of a water or sanitation investment. However, such overlaps are likely only partial, and policymakers need to assess where the health, education, and other linkages discussed in section 23.2 are important. Evaluating the importance of the linkages in tandem with the location of the poor will help guide intervention to actions that have the highest impact.

##### ***Identifying the income poor and the water and sanitation poor***

National poverty statistics will provide information on the location and profile of the poor, and they will almost always contain information on household variables such as access to water and sanitation services, and education, health, income, and expenditures. Where such poverty statistics do not exist or are considered to be unreliable, other data sources could be consulted. Guidelines for using poverty data and their different sources are outlined in chapter 1, “Poverty Measurement and Analysis.”

The following questions are important in the water and sanitation context:

- Where do the poor live and work?
- What percentage of households consume less water than the national or minimum standards recommended by the World Health Organization? What is their income and location?
- Which households have members suffering from a high incidence of diarrhea?
- How do poor households spend their income? What are their expenditures on water, hygiene, education, and health (absolute and relative to income)?
- What percentage of households have access to and use a latrine?

A profile of unserved households based on available poverty statistics will inform the water and sanitation authorities about the magnitude of the problem and—where poverty and the lack of water and sanitation access is spatially concentrated—about the geographical areas for priority interventions.

Where reliable and spatially disaggregated poverty statistics do not exist, an alternative approach would be to review existing water and sanitation use and service delivery in terms of quantity, quality, and continuity. This could be done by consulting existing reports and statistics that may have been prepared by government, nongovernment, or donor agencies, and assessing whether they contain recent information on coverage, use, and performance. More expensive alternatives include gathering the data through rapid rural or urban appraisals, focus groups, or traditional surveys. Ideally, these would be carried out as part of a more comprehensive statistical capacity-building effort (see chapter 5, “Strengthening Statistical Systems”).

Relevant spatially disaggregated administrative and budget data on water and sanitation use and performance could include the following:

- existing water supplies (mains, standpipes, wells, water vendors, illegal connections, and so on);
- users by gender, ethnicity, and other social categories detailing income and water and sanitation sources;
- consumption and price by supply method;
- uses and quality of each supply method (water quality, reliability throughout the year, and so on);
- distance to and number of users of the supply point;
- type of service delivery: the providers (formal and informal);
- existing on-site sanitation or sewer systems (ordinary pit latrines, ventilated improved pit (VIP) latrines, bucket sanitation systems, septic tanks, intermediate or pour flush sanitation with sewer, and so on);
- users and nonusers by type of system; and
- cost of each system and the needs for operation and maintenance.

Since there are often competing demands for fresh water resources, consumption by other users such as agriculture and industry should be included, if possible, in this initial assessment.

### ***Assessing the importance of the links***

Understanding the links between poverty and water and sanitation access may be intuitively simple. To assess the strength of these links in a particular location is difficult. Evidence of cause (lack of water and sanitation) and effect (poverty) is limited by (a) lack of reliable data and (b) confounding variables influencing poverty that are difficult to control for. Special concerns related to various effects are described below.

***Effects on health.*** Assessing the impact of water, sanitation, and hygiene on health is methodologically difficult, since a wide variety of factors influence the state of health. In addition, the relatively long time required to establish scientific proof of health benefits often renders epidemiological surveys a far larger task than can reasonably be attempted when developing a sector strategy. Technical note S.2 provides

further background on this topic and suggests different approaches that could be considered for measuring health impacts.

Posing the question on health impacts from a different angle may be a better start: Does the lack of water and sanitation infrastructure inhibit health improvements? The link to health improvements is often seen through the adoption of hygienic behavior, which is enabled through the provision of adequate services (box 23.5).

The joint monitoring of the indicators (ideally disaggregated by location) shown in table 23.1 allows a ready assessment of where linkages are weak or strong and where interventions are most needed. For example, if water availability has increased rapidly, but child health indicators remain static, hygiene behavior has probably become the critical intervention. Similarly, programs to boost indicators in column 2 will likely fail without increases in water volumes signaled by indicators in column 1. Of course, other inputs, such as education, can improve column 3 outputs without any changes in columns 1 or 2, and the strategic challenge will be to confirm linkages. For this purpose, the set of indicators should be over as long a period, with as much a level of geographical disaggregation as possible.

*Effects on education.* The link between the lack of water and sanitation and children’s enrollment in schools—either due to the absence of water and latrines in schools to the time children are required to spend collecting water—will be specific to country and cultural circumstances. Where such links are important, educational objectives may not be met. The impacts of a lack of education on poverty are discussed in chapter 19, “Education.”

As with health, the strength of the link cannot be easily assessed. One approach to the analysis would be to use school enrollment data (particularly for girls). Where a high incidence of dropout coincides with the lack of availability of water and sanitation infrastructure at the school level, further inquiries as to the reasons for the dropout may be warranted. Similarly, where the burden of collecting water falls on the children or female members of the household, a negative correlation between school enrollment and distance to water sources would be an indication that such a link exists. However, this must be confirmed through sample surveys in the affected communities. In many countries education authorities will have conducted, or know of, studies on enrollment rates that may already investigate these linkages. If studies have not been done, experience proves that the most efficient starting point is simply asking children and parents why they make the choices they do.

*Effects on gender and social inclusion.* Assessing how poor women and social groups are affected by a lack of water and sanitation services can be done in a variety of ways. Techniques include carrying out a gender analysis, or using a variety of participatory evaluation methods that will enable the poor people concerned to voice the problems they experience with limited access to, or a lack of, water and sanitation services.

*Effects on income and consumption.* Whether in rural or urban areas, if poor people do not enjoy access to efficient water services, they will face higher unit water costs that reduce consumption. The importance of this linkage may be assessed through existing household consumption studies. Such studies typically include questions of household connections to networked water, allowing a quick service profile in both urban and rural areas. To assess cost impacts on households without network supply, careful inquiry must be made of patterns of water consumption and the costs of the various alternatives used (households often rely on more than one source). The household survey cost information can be matched with direct surveys of suppliers to double check costs and coverage. Water supply

**Box 23.5. Minimum Evaluation Procedure**

**Health improvements are only the culmination of a long causal chain. It runs from the original construction of the water supplies or sanitation facilities through their operation and use, permitting changes in hygienic behavior and thus the prevention of disease transmission. The principle of the World Health Organization Minimum Evaluation Procedure is to examine the intermediate links in the chain—functioning and usage. Hygienic behavior is another such link.**

*Source:* Water and Environmental Health at London and Loughborough (WELL). 1999. “Measuring the Health Impact of Water and Sanitation.” Technical Brief No. 10.

**Table 23.1. Indicators for Studying Possible Infrastructure and Health Linkages**

<i>Indicators that assess the level of water and sanitation infrastructure</i> (1)	<i>Indicators that assess the use of the infrastructure and hygiene behavior</i> (2)	<i>Indicators that assess the health situation (reported by households/clinics)</i> (3)
<ul style="list-style-type: none"> <li>• Percentage of households with water supply connections</li> <li>• Percentage of households with access to public water delivery point within 30 meters of residence</li> <li>• Average distance to delivery point from households</li> <li>• Number of people per public water delivery point</li> <li>• Percentage of population consuming less than 20 liters per capita per day</li> <li>• Percentage of households connected to piped sewer system</li> <li>• Percentage of households with access to functioning sanitation system within 10 meters of residence</li> </ul>	<ul style="list-style-type: none"> <li>• Household water consumption</li> <li>• Household expenditure on soap</li> <li>• Household expenditure on detergents</li> <li>• Hand washing after defecation</li> <li>• Hand washing before food preparation, eating, and child care</li> <li>• Absence of fecal material on latrine surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• Child Health:</li> <li>• Infant mortality rate</li> <li>• Childhood mortality rate</li> <li>• Prevalence of malnutrition</li> <li>• Incidence and prevalence of main diseases:</li> <li>• Diarrhea</li> <li>• Dysentery</li> <li>• Hepatitis A</li> </ul>

conditions often vary significantly among cities and rural areas within a country, so care must be taken in extrapolating results of small samples.

Care must also be taken when assessing income effects. For example, if a water and sanitation investment frees women's time from water gathering or treatment, that would not by itself fully liberate a woman's income earning potential if more general social disapproval of female labor mobility overlay the water and sanitation situation.

Tracking urban water prices and quality across seasons will reveal whether seasonal water scarcity or quality risks are an urban problem. That said, conditions can be radically different from year to year. For rural areas, water impact assessments must be made during all seasons to properly capture risks. Again, results can vary substantially from year to year.

### **23.3.3 Understanding the situation of the poor**

The foregoing analysis provides insights on the strength of the linkages between water and sanitation and poverty. This section provides guidance on assessing the needs and demands of the poor in specific locations and on understanding the constraints they face in accessing water and sanitation services.

#### ***Assessing the needs and demands of the poor***

There are various approaches to assessing the demands of the poor, ranging from revealed preference surveys to participatory rapid appraisals. All of them have pros and cons in terms of expected benefits and their suitability for different purposes, as detailed in technical note S.3. Whatever the approach taken, the objective is to understand people's preferences, the levels of service for which users are willing to pay, and what financing and delivery mechanisms might ensure that the poor have affordable access.

Water and sanitation interventions never take place in a vacuum. Even the poorest communities may have individuals or small groups selling water and sanitation services. A failure to properly consult the poor on their preferences and current practices may lead to interventions that are simply not used or have a negative economic return because they displace existing water and sanitation services or facilities without offering significant quality or other service improvements.

Principles to be observed when conducting needs and demand assessments include ensuring that

- the voices of the poor and underprivileged are heard and included in decisionmaking;

- the preferences for services expressed by different groups and the contribution they are willing and able to make are clearly understood;
- gender and cultural differences in the needs of different groups are recognized; and
- the existing networks, power structures, and institutions are taken into consideration.

While recognition of the needs or demands felt or expressed by the poor is important, they may not be the sole determinant guiding interventions. For example, because it is a public good, sanitation may not get the attention it would deserve, and the lack of expressed demand is not a signal for doing nothing. It may rather point to creating demand for sanitation through hygiene education and increased awareness of its benefits.

### ***Understanding the constraints***

Demand assessments will provide some information on the constraints the poor perceive in accessing services. Some inhibiting factors may, however, not be known to the household, and they may therefore not surface in household interviews. A constraint analysis would consider both the obstacles recognized by the poor and other limiting factors that may indirectly influence household access.

In a general sense, people have inadequate water and sanitation because they are poor and lack the income to purchase the services they want. However, as discussed in section 23.2, the poor often pay more for their access than do the better-off households, both in absolute terms and relative to their income. Poverty alleviation programs seek to improve the income of the poor and thus their purchasing power. Pro-poor water and sanitation programs seek to improve access to services through policies or investments that reduce costs.

At the center of understanding the constraints is a good knowledge of the institutional, political, and regulatory framework that governs decisions by, and incentives of, the key stakeholders. The constraints on accessing water and sanitation services are likely to differ among rural areas, small towns, and cities. Location-specific features are explored below.

***Rural areas.*** The outreach of central government is often limited in rural areas and focus on district centers remote from communities requiring assistance. This makes government agency managerial and logistical support cumbersome and costly, and unattractive to agency staff. In addition, the general lack of communication infrastructure such as roads increases the cost of accessing markets, clinics, schools, and other services, and reduces information flows from and to isolated communities. More details are provided in chapter 15, “Rural Poverty.”

In other situations it is not the remoteness that determines the poverty of a location. In many villages the poor live among the better-off households, and their constraints to accessing water and sanitation services are more likely associated with their lack of power to be properly consulted on their needs or to influence decisions.

***Small towns.*** Small towns are perhaps best defined as being large enough that collective action and community management do not easily emerge yet too small to meet the fixed costs of a formal utility organization. Technically, their water supply and sanitation needs are not amenable to simple, point source solutions (such as a spring or a borehole), but the appropriate water and sanitation services have technical and managerial requirements that exceed the capacity of most small community organizations. Small town governments may not have the fiscal or legal authority to provide or regulate private provision of services that would be efficient or responsive to local needs. Even where towns have such authority, staff capacity to play these roles may be weak.

***Urban and peri-urban areas.*** Slums and informal settlements housing the urban and peri-urban poor are commonly found on low-lying, flood-prone land, leading to drainage and sanitation problems, or on the steeply sloped hills, from which the residents have to descend to collect water. These places are often geographically isolated, dangerous, unhealthy, and lack basic infrastructure and services. Illegally squatting on a piece of land left vacant for the above reasons, the poor lack title to the land they occupy. For this reason, they have no access to formal service provision such as water and credit, they must rely on temporary, low-wage employment in the informal sector, and they are harassed by the authorities or

exploited by criminal gangs and profiteers who take advantage of their lack of recourse to the legal system (more details on the situation of the urban poor can be found in chapter 16, “Urban Poverty.”)

In addition to the constraints associated with urban poverty, urban water supply, in contrast to rural water supply, generally relies on a hierarchical system of networks that feed into neighborhood-level tertiary distribution systems. Serving the urban poor through the formal networks requires sufficient capacity in the primary and secondary network and adequate economic returns.

Network capacity increases may not be feasible where water resources are scarce, calling for careful management of water demand (financial and physical controls). And where economic returns are low, as is common in fringe or poor areas, there is low incentive for a utility to provide services. Combining this with the perceived high risk and, at times, legal constraints to delivering services to informal settlements renders financial costs prohibitively high. Possible activities aimed at reducing costs and ensuring adequate economic returns, such as providing bulk water to the edge of the informal settlement and allowing residents to organize and manage water distribution, are sometimes frustrated by unrealistic design and engineering standards that require household connections.

Construction of latrines and washing facilities is, by contrast, generally not limited by network economies. On-site sanitation, instead of sewerage connections, may be a suitable technical option and should not be discouraged without evidence of likely environmental damage. The constraints to on-site sanitation solutions are associated with other factors, such as lack of space for individual latrines in a densely populated slum or the reluctance to share a public latrine. The latter are often not well maintained and may not grant the privacy users require.

Constraints to service provision—many of which are interlinked—vary among rural, small town, and urban areas of a country. One of the larger challenges in developing the Poverty Reduction Strategy for water and sanitation will be understanding how the constraints function in the differing governance, financial, and social environments within the country. Table 23.2 presents one example of listing constraints and their relative importance. This work, when combined with the mapping of the poor discussed in the next section, provides the basis for prioritizing government interventions.

### 23.3.4 Targeting the poor

The foregoing sections identified the dimensions of poverty that need to be assessed when developing a Poverty Reduction Strategy. The impact of current government policy, whether the poor are indeed suffering from water and sanitation shortages, and understanding the behavior of the poor in the face of deprivation, all need to be understood when designing a water and sanitation program that targets the poor. If that analysis can be undertaken, it should reveal how best to target sector investments. But where large data or other gaps prevent good analysis, a simple methodology can yield a set of initial targets that can be refined as experience accumulates.

If poverty mapping data exist and show a very high overlap between income poverty and poor water and sanitation services, a poverty-oriented strategy could simply seek improved coverage within poor communities, using World Health Organization minimum standards as a norm. However, such a program should be complemented by work to better identify the relative impact of water stress and the poverty–water links discussed in section 23.3.2.

If one or more of the links stand out in either the initial or follow-up analysis, the strategy would concentrate resources on that link. For example, if the lack of water and sanitation in schools plays a major role in inhibiting girls’ schooling, the strategy could complement education sector resources with those from the water sector to provide needed water points and latrines. If sanitation coverage is good but health outcomes are still poor, further analysis might show that emphasis must shift to hygiene education. In that case, water sector financial resources might be less important than efforts to convince education and health authorities to add this to their own agendas.

An analysis of the constraints may orient strategy toward interventions that remove service barriers faced by the poor. Those interventions, however, may not be in the water sector itself. For example, if the poor are deterred from connecting to water or sanitation services by the initial capital investment, the key

**Table 23.2. Problems Limiting Access to Water and Sanitation Services and their Relative Importance by Location**

<i>Problems</i>	<i>Relative importance</i>		
	<i>Rural areas</i>	<i>Small towns</i>	<i>Urban areas</i>
<b>Policies</b>			
<b>Subsidies.</b> Untargeted broad-based subsidies often fail to reach intended beneficiaries, while reducing limited public funds for more targeted interventions.	high	high	high
<b>Volatile and uncertain political climate.</b> Uncertain private property rights and insufficient safeguards either deter private investors or increase the price of capital.	low	moderate	high
<b>Water resource management policies.</b> Absence of clear policies or water resource management or unclear property rights may lead to unsustainable extractions (for example, agriculture, industry), reducing overall groundwater sources, and polluting surface waters, thereby limiting the potential uses of surface water and increasing the cost to downstream users.	high	high	high
<b>Laws and Regulations</b>			
<b>Insecure land titles</b> makes formal network connections illegal or increases uncertainty and reduces investment incentives (for example, piped water system).	low	high	high
<b>Exclusive rights to providers</b> reduce competition and innovation and can prevent the poor from getting services from alternate providers where network services are not readily available.	low	moderate	high
<b>Technical standards</b> , which are inflexible and unrealistic, reduce affordable technical choices by increasing the cost and creating entry barriers for potential providers.	moderate	high	high
<b>Institutions and Governance</b>			
General lack of administrative, managerial, and technical <b>capacity</b> of both central and local government institutions—exacerbated outside principal cities by poor transportation and communication networks—constrains effective interaction with consumers and other stakeholders, reducing the access to information.	high	moderate to high	low to moderate
The presence of <b>corruption and lack of transparency</b> in decisionmaking of public institutions creates barriers to private competition and participation of the poor (who lack the voice or the money to bribe).	high	high	high
Absence of <b>social capital</b> (defined as the ability of individuals and households to secure benefits from being a member in social networks and other social structures) reduces the effectiveness in reaching the poor as beneficiaries from service provision.	moderate	high	high
<b>Affordability</b>			
<b>Credit constraints</b> due to underdeveloped financial markets, lack of creditworthiness of customers, and high transaction costs and absence of flexible payment mechanisms render investments that require cost contributions less affordable to the poor.	high	high	high
<b>Connection cost and tariff structures.</b> High connection fees or tariff structures (for example, increasing block tariff structures) at times make the cost of water prohibitively expensive.	low	moderate	high
<b>Quantity of consumption.</b> Lack of incentives for providers to serve the poor because low consumption does not provide sufficient economies of scale to cover the initial high fixed costs of the investment.	high	high	high
<b>Location-based affordability constraints.</b> Where poor communities are inhabiting marginal lands or remote locations more expensive to serve from the engineering point of view, incentives for service provision are low and where these services are provided they tend to be more expensive.	high	high	high

intervention may be access to flexible payment mechanisms or small credit schemes that allow them to spread costs over a longer period.

Finally, with the insights gained from this work, the existing national strategy for water and sanitation must be revisited for realism and consistency with the evolving goals in the PRSP. These initial goals must also be tested against the tools available to government for meeting them. As the next section stresses, government's most effective tools may be incremental policy change rather than incremental financing. The "Water Decade" of the 1980s pressured governments to boost spending on potable water supply. Countries have seen very slow progress since then. An important reason for that slow progress has been capture of the benefits by the nonpoor. Many countries now need to shift responsibility for water and sanitation services for the nonpoor off government budgets, freeing resources for their PRSP.

## 23.4 Options for Government Intervention

This section suggests a framework for considering options to close the identified service gaps. This does not necessarily mean that the government provides the services. Reduced government and increased private sector involvement may be appropriate, in which case the government intervention could be the removal of regulatory or legislative obstacles to private sector participation.

*Rethinking sector strategy.* Sector strategies that most effectively reach the poor emphasize efficient service delivery and improved targeting. With this in mind, the sequence of strategy formulation should begin with sector policy. Sector policy to help deliver better water and sanitation to the poor will be either hindered or supported by the overall national institutional and policy environment. Other chapters of this book address those important issues (for example, chapter 8, "Governance," and chapter 6, "Public Spending"), which will not be repeated here. Instead, this discussion concentrates on the sector policy environment and related choices about sector financing and direct service provision.

The impact of sector policy on the poor may be difficult to ascertain. For example, many countries have seemingly innocuous engineering standards specifying pipe size and materials, trench characteristics, delivery pressures, and so on; standards most often adopted from international (industrial country) norms. Two immediate problems arise. First, technology has been changing rapidly in recent years and standards may not have kept pace. In this case, new and cheaper engineering solutions may be ignored, to the detriment of the poor. Second, even when technology has not advanced, use of a lower standard may permit cheaper service to the poor. (An example might be a community water system operating at lower pressure than the urban standard, through pipes in trenches shallower than the standard.) The cost savings in such an approach may be sufficient to allow network service to the poor, a service much improved over current levels, even if it increases the risk of pipe failure.

Many other sector policies should be examined for their impact on service delivery to the poor. Does procurement policy make community contracting difficult? Labor policy may slow the entry of the private sector. Subsidy policy may favor wealthier communities that more easily generate matching funds or find political support in the legislature. Pricing policies might hinder cost recovery and jeopardize the sustainability of services and their extension to unserved, poor communities. Community consultation policies may overlook the poorest elements of generally poor communities. For example, a recent village consultation in one country showed that the very poorest ranked drinking water supplies as the most important investment, while the less poor ranked irrigation water most highly.

Sector policy should stress efficient service delivery. Many national, local, and consumer resources have been absorbed in inefficient operations that leave few resources with which to expand service access or improve service quality. Government has tools to address this, either through institutional change—most commonly the introduction of private operation—or through financial changes that shift payment burdens in a way that forces greater accountability.

Policy interventions are typically broad based and therefore may not be targeted exclusively to the poor. At a minimum, however, the government should ensure that policies avoid hurting the poor. While not all policies will speak directly to the needs of the poor, those on financial and service provision mechanisms generally can aspire to target them. The service gaps analysis, poverty mapping, and water

supply and sanitation system–poverty linkage assessment described in earlier sections provides the basis for this.

Poverty mapping, for example, will almost certainly reveal that needs are far greater than the government’s direct capability to satisfy them in a reasonable timeframe, reinforcing the requirement of effective government policies that support self-supply and other private solutions.

Settlement density and institutional structures play a large role in the choice of water supply and sanitation technology. Densely settled urban areas are almost always most efficiently served by piped water networks, and effluent concentrations nearly always demand collective handling. Such areas usually have local government units with substantial power to regulate, finance, or provide services. Small towns often have less obvious technical solutions, dependent in part on unknown future growth possibilities. In some countries they will have sufficient governance power to regulate or provide services, while in others they lack this power and staff capabilities. Rural areas typically lack the density that keeps unit costs low in piped networks, and they lack governance powers that lead easily to effective organization and regulation of such public supply. Sector policy and other interventions must take these differences into account.

Government can play three different roles in improving water and sanitation services:

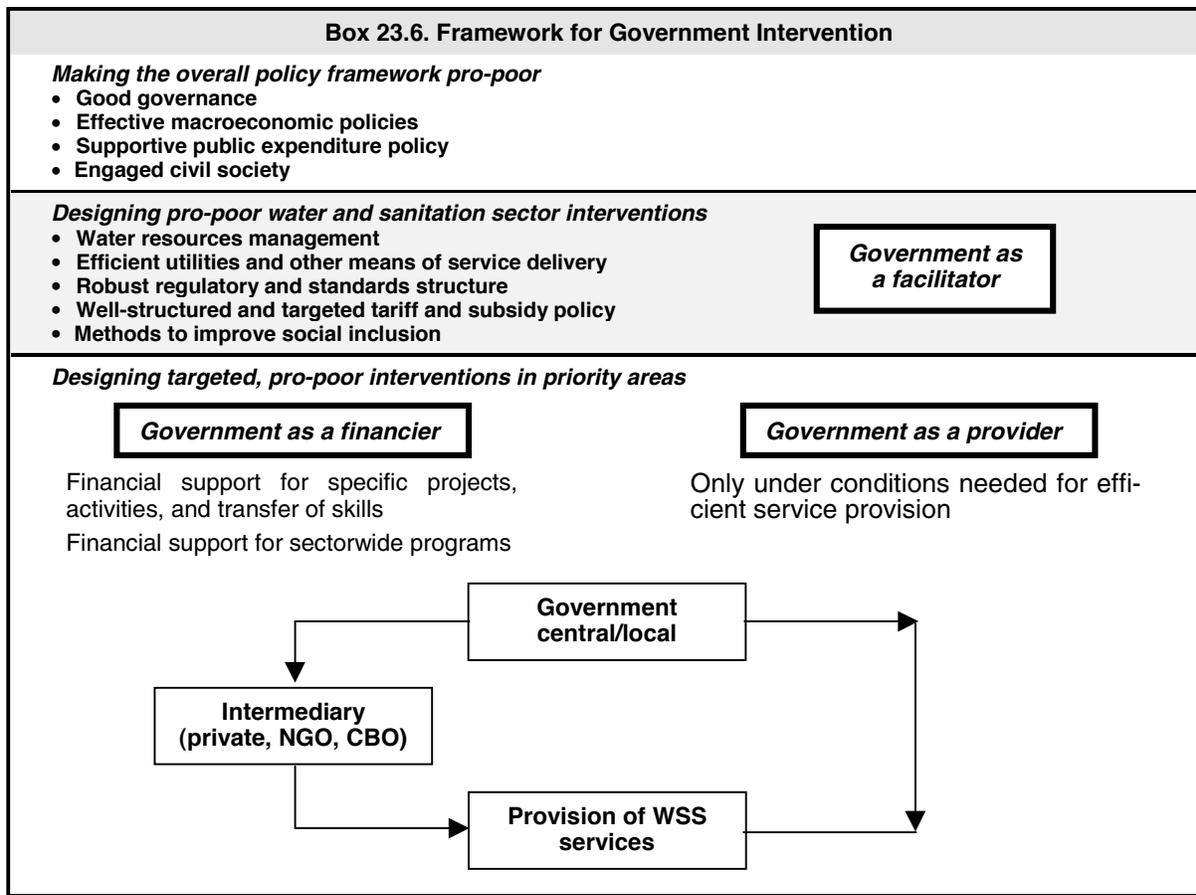
- a facilitator through an effective balance of sector organization and policymaking, including regulation and standard setting;
- a financier through targeted subsidies and support to private, community-based solutions to water and sanitation problems, or to private or public service providers; and
- a direct provider (although rarely) of services targeted to the poor.

Depending on the country and the geographical focus (urban or rural), the role of the government may be very different, as will be the mix of interventions. However, one important lesson from international experience is that governments need to work more on the facilitating the role of structuring good policy and institutional support for improved water and sanitation. Too often governments attempt to close service gaps through direct financial support or provision of services in a weak policy and institutional environment. The result has consistently been that services to the poor improve little or not at all. In urban areas, resources are lost in hugely inefficient government utilities that deliver little water to the poor. In rural areas, wells and pumps are put in but not maintained, and their service quickly deteriorates. Urban sanitation investments go to sewers for the better-off housing estates, or public toilets so badly kept that they repel visitors, while rural latrine subsidies go to the better-off rural households.

Because of the international experience, the ensuing discussion will stress the facilitator role. Progress on policy and institutional constraints costs relatively little in cash terms, but political costs may be substantial. The status quo tends to favor the wealthier and politically more powerful segments of society, groups that may not enjoy the pricing reforms nor pressure for efficient services that will free resources to expand coverage to the poor. They may not want to be reminded that the subsidies given to public systems in the name of the poor never reach that group, which continues to rely on more expensive, unsubsidized private services. The most sustainable means of freeing resources to spend on the poor may be through changing long-standing practices of distributing the benefits of public finance through routine subsidies for the operation of water and sanitation services. Box 23.6 summarizes the framework within which government and other actors operate.

### **23.4.1 The government as facilitator**

Historically, and today in most low-income countries, the poor provide their own water and sanitation services, obtain them through community groups, or purchase them from private operators. For this reason, the starting point in designing or updating a poverty-oriented sector strategy must be that array of government laws, regulations, and institutions—the facilitating tools of a government—that help shape such service provision. Government policy choices can encourage (or discourage) demand-responsive and cost-conscious service provision. It can reinforce competition through transparent market entry and



protect the marketplace from arbitrary government action, or it can increase the cost of services to the poor through inappropriate entry restrictions or regulation.

This section highlights possible government policy interventions that help the poor benefit from water and sanitation policies. The arena for action is large, and the importance of policy areas will vary substantially among countries. The following list of policy areas is designed as a reminder of what may be important, rather than a ranking of importance.

### **Improving the overall policy framework**

A policy framework for improving water and sanitation services for the poor rests on a number of pillars: (a) sustainable management of water resources, (b) efficient delivery of public and private services, (c) better access to those services, (d) research, development, and implementation of low-cost technologies, and (e) functioning pro-poor financial mechanisms.

**Water resources management.** Every country's water resource management regime has a major long-run impact on the quantity and quality of water available to the poor. The basic pro-poor goal coincides with that for society as a whole: to protect and equitably share water resources in a way that ensures sustainable access to low-cost, reasonably quality water supplies. The review of water use by the poor through the tools mentioned in section 23.3 will allow judgment on whether they are losing water access because of pollution or excess withdrawals by others. Where such losses are found, government intervention will usually be needed to design or enforce pollution control regulations (see chapter 11, "Environment," for guidance), help bring together water users to improve resource management, or to protect existing rights of the poor. Most countries have made slow progress in dealing with these issues, but failure here must typically be answered with costly treatment technologies, development of alternative water sources, or increased morbidity among the poor.

**Efficient public and private service delivery.** Public water and sanitation services are often plagued by inefficiency, which drives up service costs, restricts coverage, and leads either to needlessly high tariffs or equally needless subsidies. This performance has led to a recent increase in the number of public systems that have been concessioned or have otherwise brought in private operators. Technical note S.7 describes the privatization option in more detail. Private network services will likely have good technical efficiency for the level of inputs they use, but they may provide inferior or no services to the poor if the regulatory regime does not provide the right incentives for good performance. In creating a pro-poor sectoral policy environment, the following dimensions of the efficiency challenge deserve attention:

- **Competition and market structure.** Policy should support competition in infrastructure services. This is often best done by avoiding exclusive service licenses, service standards that force use of a particular technology, or high fixed administrative costs for businesses entering the market. The policy challenge is greatest in urban areas, where the middle- and upper-class neighborhoods may be served by network supply. In such cities, the poor often rely on standpipes, private vendors, or community supply. The regulatory temptation will be to dictate equal standards for all suppliers in such cities, but rules appropriate to large urban networks may be unworkable for the otherwise acceptable nonnetwork suppliers of the poor.
- **Regulation of water and sanitation suppliers.** The importance of water and sanitation services to public well-being dictates that they be regulated. Despite the value of competition, most urban citizens will be supplied through network utilities with substantial monopoly power. Good regulatory regimes will encourage more competition for the right to provide services, thus holding down costs. Such regimes will promote access to information and open competition in awarding contracts. They will benchmark utility performance (public and private) through databases of performance indicators. One benchmarking component can be service to the poor, measuring coverage in poor neighborhoods, and utility response to service or customer problems, analyzed on a neighborhood basis.

**Improved access.** Improving access by the poor may need to confront complex, multisectoral problems. For example, one common problem arises from property rights and land tenure. Without customer security of land tenure, utilities or other providers may face great risk investing in service to peri-urban and slum areas. These issues are discussed in detail in chapter 16, “Urban Poverty.” One challenge for network supply expansion comes from the relatively high upfront costs of a connection and in-house plumbing. The poor typically lack access to local capital markets or financial intermediaries. Policies that develop financial institutions, including microcredit, and reduce transaction costs will increase the ability of poor households to connect. They will also provide the means for utilities or small-scale private entrepreneurs to invest. Finally, but only with the support of sustainable financing regimes, utilities may be required to undertake universal service obligations. Such obligations must be designed with great care. Policies forbidding disconnection, for example, can encourage consumer refusal to pay reasonable and necessary service costs.

**Research and development.** Modest financial assistance may be devoted to supporting technological or social measures that aim to increase the affordability or availability of infrastructure services. For example, such a program could pilot innovative, community-based sanitation or water delivery institutions or technologies. When choosing areas to support, care must be taken to understand how the pilot project will be scaled up to broad regional or national use.

**Pro-poor financial policy.** Government policy on tariffs and subsidies may influence access of the poor to water and sanitation services even when government plays no direct financial role. For example, government may dictate tariff structures, collection policy, and cross-subsidy policy where services are privately supplied. Tariff and subsidy design will typically play a large role in strategy formulation.

Full-cost recovery for water and sanitation suppliers need not conflict with reducing poverty. Many studies have found that poor people already pay high prices and a significant proportion of their income for water supply. They often have little choice but to pay those costs if they buy water from private suppliers, as do so many of the urban poor. Ways should be sought, however, to ensure that the poor have access to a minimum volume of water necessary to meet their basic needs at an affordable price. Box 23.7 shows possible approaches, ideally within the context of the reform of a utility’s cost-recovery policy.

**Box 23.7. Meeting Poverty Objectives while Restructuring Utility Cost Recovery Policy**

- **Avoiding reverse cross-subsidy—ensure that poor people are not charged more for their water than better-off users.**
- **Identifying the poor and providing direct government payment to the utility for a portion of their bill.**
- **Easing the cost of connections for low-income users by subsidizing connection costs, or by allowing connection fees to be spread over a longer period, and included in monthly bills.**
- **Lifeline tariff—charging a low (often flat) rate for low-income or low-volume users. A typical ceiling for the lifeline tariff would be 6–8 liters per capita per day.**

*Source:* DFID (1998).

The basis for tariff reform should be an analysis of the utility’s financial costs and the economic costs of supply (and of necessary wastewater collection, treatment, and disposal), complemented by an analysis of consumers’ willingness to pay for water, and a financial analysis of existing and planned subsidies.

Sanitation services pose a special challenge in designing financial policy. The poor directly and almost fully capture the benefits of improved water services, but improved sanitation services may be perceived more in terms of convenience (for example, greater privacy) than the health benefits that drive pro-poor sanitation policy. This may lead the poor, and poor communities, to underinvest in sanitation. The health externalities argue for subsidies to close the demand gap, but in poor rural communities experience has shown that subsidy programs for improved latrines primarily benefit a small number of wealthier households and fail to reach the poorer households. Effective hygiene education campaigns may help close the demand gap and lower the subsidies needed to reach any target coverage level. Lowering sanitation investment and operation costs may be more effective than demand subsidies. This could be done through aiding small businesses to provide products and services rather than by subsidizing the products themselves.

Subsidies for the operation and maintenance costs of sewerage services should be avoided because they will typically be captured by the middle- and upper-income households and commercial and industrial users who are the first sewered. Recovering operation and maintenance costs through sewerage surcharges based on water consumption has the benefit of discouraging excessive water use.

### ***Improving services in rural areas and small towns***

Strategy development for rural areas and small towns hinges on institutional strength in such areas. Private water service provision is likely to dominate in these areas either through self-supply or vendor supply. Other common modes include community supply through standpipes or networks. Sanitation services, even more than water, rely on self-supply.

Direct government investment to increase rural and small town services has a dismal record of failure. The essential problem has been sustainability, an issue itself linked to initial technological choice and financing arrangements. Government often lacks low-cost means of working with communities, a challenge answered by shifting to a model of community-driven development. (Chapter 9, “Community-Driven Development,” discusses approaches that rely on community contracting or management.)

A rural and small town strategy should seek opportunities to reduce the cost of improved service. This section has already discussed the role of a research and piloting program to test new technologies. Another avenue to reduce costs is to improve the flow of goods and services to the rural areas. This flow is known as the “supply chain.” If pumps, pipes, latrine pans, spare parts, and so forth cannot be purchased locally, or have high price markups resulting from distribution inefficiencies, investment will be reduced. Although these constraints are known to be important, our understanding of how to overcome them is not well developed. In the case of hand pumps, preliminary research results suggest that having more than 200 installed within a local marketing area provides sufficient demand for parts that retailers will stock them. This, in turn, suggests that government efforts to popularize such innovations should avoid piloting small numbers over a large area—all will fail because of a lack of inexpensive repairs. On the contrary, geographically more concentrated investments may have the benefit of creating self-sustaining local parts supply and repair skills.

Village or small town water and sanitation supply often presents the challenge of being too small to enjoy substantial economies of scale or generate sufficient revenue to retain high-quality staff. Sector strategists will face difficult challenges in giving guidance in the choice between network and individual supply. Governments can assist by

- exploring possibilities of arrangements between towns and villages to develop effective services on a regional scale, and
- providing managerial and technical help through staff who move among localities, either on demand or on a regular schedule. These staff will provide training and assist in trouble-shooting.

Where community-managed water and sanitation services appear the most effective way to proceed. Table 23.3 below outlines key design principles that are further elaborated in technical note S.4).

### **Urban and peri-urban areas**

In urban settings, sector policy should seek to substantially increase efficiency in network supply. This may not in itself improve service to the poor, but it is a precondition for expanding such service. A diagnosis of current efficiency can be done with the help of benchmarks established for similar water supply systems elsewhere. This often reveals very high leakage from physical causes and, sometimes, illegal connections, as well as high usage of low-quality labor input. Investing additional funds in such a system will probably lead to increased expenditure on labor and other inputs but very little additional water reaching the poor.

Any government seeking to close gaps in urban network services to the poor should, at a minimum, study both the efficiency of the current public services and compare them to the efficiency of private services in cities of similar size in other countries at similar income levels. This will help highlight whether private provision offers significant scope for savings.

The countries most successful in expanding urban water service provision are those that charge cost-covering tariffs. This permits self-financing by systems, thereby ending public fiscal burdens. Because they are paying full costs, customers are more likely to demand adequate service. Covering costs of existing service may not provide enough cash to expand service to the poor, but it allows the utility to efficiently operate the existing system, and it ends general system subsidies from the government, subsidies going mostly to the nonpoor. These actions, in turn, facilitate the introduction of pro-poor policies, whether the utility is publicly or privately managed. Good pricing policy thus forms a key element of pro-poor policy and should be implemented before either a switch to private providers or programs to increase public utility efficiency. And those actions must precede the injection of additional public funds to expand services. Box 23.8 summarizes the steps to reaching the urban poor through network supply.

The network efficiency efforts must recognize that the poor continue to rely on various forms of non-network water supply. Thus an urban sector strategy should seek to minimize the cost of alternative supply sources, even when the long-run policy goal may be complete coverage by network supply. This does not entail subsidization, but rather that government provide a policy environment that permits alternative suppliers to operate under business conditions no less supportive than other business lines.

#### **Box 23.8. Steps to Reach the Urban Poor through Expanding Network Supply**

- 1. Analyze current supply efficiency and the cost of efficient supply.**
- 2. Restructure tariffs to eliminate general subsidies and increase revenue to fully cover the cost of efficient supply.**
- 3. Concurrently implement lessons of step 1 to boost utility efficiency through new labor and wage policy, metering, and so on through the public sector or public/private partnerships.**
- 4. Introduce pro-poor policies (that is, increased connection rates) based on the anticipated higher utility efficiency. This would be part of the regulatory and incentive framework in a switch from public to private operation.**
- 5. Introduce complementary measures such as credit schemes to finance hook-up costs for the poor.**

**Table 23.3. Key Design Principles for Rural Water Supply and Sanitation Interventions**

<i>Policy area</i>	<i>Identified constraints</i>	<i>Possible interventions</i>
<b>Policy environment</b>	Limited political commitment, weak legal framework, and poor governance lead to unstable policy environment for sector. This results in: underinvestment, undefined ownership, poor participation, weak regulation, and conflicting priorities.	<p>Promote a demand-responsive approach where communities make informed choices regarding their participation, service level, and service delivery mechanisms.</p> <p>Promote institutional reform based on clear roles for key stakeholders where communities own their facilities, the private sector provides goods and services, and government facilitates the process.</p> <p>Ensure appropriate legal framework for ownership and management.</p> <p>Implement community water supply projects within the context of broader community and local government development.</p>
<b>Financing options</b>	Demand for services is increasing, but service expansion has been constrained by insufficient resource allocation from the public sector, inefficient investments in costly schemes, and a lack of capacity to mobilize resources from users, local government, private sector, and others.	<p>Establish financial policies that underpin demand-responsive approach where communities pay part of the capital cost in proportion to the cost of the facilities and all operations and maintenance costs.</p> <p>Promote increased capital cost recovery from users by establishing mechanisms that reduce upfront capital cost.</p>
<b>Service delivery options</b>	Government monopoly on service provision has resulted in lack of accountability and community ownership, poor management and sustainability, low-quality services, and weak development of private sector and alternative delivery options.	<p>Support formation of representative water user associations for planning, implementation, and management of community water supply facilities.</p> <p>Promote community contracting and transparency in all procurement.</p> <p>Create competitive environment for allowing communities to access a range of providers of goods and services for all aspects of the project cycle.</p>
<b>Hygiene and sanitation</b>	Full economic and health impact of improved community water supply are often not achieved due to lack of attention to hygiene education and sanitation. Approaches to sanitation have focused mostly on technology aspects, rather than on behavior changes and creating a market (supply and demand) for sanitation facilities.	<p>Integrate water, sanitation, and hygiene education in community water supply projects.</p> <p>Promote user investment in sanitation through public awareness and education in hygiene and environmental sanitation. Strengthen the private sector's ability to construct facilities.</p>
<b>Participation and gender</b>	Lack of community, and especially of women's, involvement, is a major cause of poor service sustainability. Traditional project design did not consider the project rules and incentives required to achieve full participation.	<p>Demand-responsive rules, tools, and incentives for project staff to include excluded groups will help achieve full participation and improve outcomes.</p>
<b>Poverty and access</b>	Majority of clients are the poor, and poorest are outside the cash economy and politically weak; it is easier to provide services to the rich; population is increasing; and there are decreased services and resources as well as lack of political commitment toward the poor.	<p>Set rules to target poor, unserved communities and vulnerable groups in these communities:</p> <ul style="list-style-type: none"> <li>• Develop baseline information, identify vulnerable groups, and monitor access of the poorer communities to project services.</li> <li>• Expand range of technology options, building on existing resources in community.</li> <li>• Ensure adequate flow of information to all eligible communities and ensure adequate social intermediation and participation by all groups, including women, poor, and minorities.</li> <li>• Recognize and build on informal safety nets within communities.</li> <li>• Involve women and minority groups in community decisions and management.</li> </ul>

### 23.4.2 The government as financier

Governments tend to have a low success rate in financing water supply and sanitation for the poor. Too often funds and subsidies fail to reach the intended beneficiaries, and they have typically proven unsustainable.

#### **Government financing**

The type of assistance that may be provided by government in partnership with donors and financial institutions includes both conventional capital aid (financial support for specific projects and activities) and technical cooperation (transfer of skills). There is also the option to provide resources more strategically in support of sectorwide programs. For the water supply and sanitation sector, the various types of assistance may be managed through long-term development assistance programs (for example, multidonor, sectorwide approaches or sector investment programs).

Government may also financially support utilities during the reform process. Indeed, a key issue is to establish financially autonomous utilities: poor people are unlikely to benefit from system expansion to cover low-income areas unless steps are taken to tackle the financial and operational weaknesses of the utility as a whole.

Other important issues include the following:

- Avoid grants that promote irresponsible pricing or excessive capital investment.
- Promote links with municipal finance and fiscal decentralization reforms. Municipalities that are in systemic deficit may use the cash flows of their utilities to fill financial gaps. On the contrary, municipalities that can benefit from generous tax breaks or grants may lack incentives to adopt efficient institutional setups or to price water responsibly.
- A key challenge is to have banking and capital market resources available locally and help utilities tap these local markets. Where government provides financial assistance, they should make equity and quasi-equity contributions and provide guarantees, using direct loans only as a last resort.

#### **Subsidies**

Many national and local governments devote considerable resources to subsidizing the capital and operating costs of water and sanitation schemes. In country after country, however, studies of the impact of those subsidies show that the benefits go primarily to the nonpoor. Several factors drive this result, such as the grant nature of many of these projects that removes much of the incentive for careful procurement, and funds end up with construction firms through excessive capital costs. Second, inefficient operation of investments similarly diverts funds to employees or suppliers. Third, network water supply or wastewater collection services go primarily to the nonpoor, thereby allowing them to capture the bulk of subsidies to such systems. Fourth, subsidies are often positively related to consumption, which is higher for the nonpoor. Finally, where subsidies come with beneficiary cofinancing requirements, they tend to go first to the nonpoor or less poor people better able to meet that requirement. Thus the first challenge in rethinking subsidy strategy is to analyze the poverty impact of existing subsidies. Technical note S.5 provides several country case studies showing how the analysis has been done and has facilitated subsidy redesign.

The economic rationale for subsidies—to offset market inefficiencies where prices fail to reflect significant external benefits—supports their use in certain well-defined water and sanitation projects. But the lessons cited in Technical note S.5 show very few cases where income redistribution occurs efficiently through such projects. The externality argument can certainly be made for subsidies in some sanitation projects, but again the challenge is to target the benefit to the poor. The nonpoor, who could afford improved sanitation without subsidy, are often the main beneficiaries. Good subsidy design recognizes these problems and seeks approaches that maximize benefits to the poor. In the sanitation case, subsidies could support hygiene education and sanitation promotion through means known to reach the poor. For example, in a region with low literacy, this might imply reliance on oral teaching and pictures rather than text.

Subsidy design problems are not unique to the water and sanitation sector. Good policy design principles apply to all utility services and, more broadly, are best applied through an income policy with national scope. Because of their common features across infrastructure, subsidy design is treated in box 20.5 of chapter 20, “Private Sector and Infrastructure: Overview.”

In summary, government financing can play a valuable role in improving water and sanitation services to the poor. But historically much of the benefit of such efforts has gone to the nonpoor. The challenge facing the sector strategy is thus effective targeting. In most cases, that will mean avoiding blanket subsidies and looking for ways to reduce input costs, increase private demand for sanitation, and facilitate the extension of credit to the poor.

### **23.4.3 The government as provider of services to the poor**

Governments have often proven to be very inefficient direct providers of water and sanitation services to the poor. Whether in rural areas, where they face high overhead costs in service provision, or urban areas, where state-owned firms in water and sanitation fare no better than those in any other sector, government services consistently fall well below efficiency benchmarks set by the private sector. The result is higher cost services that fail to meet quality or coverage targets. Exceptions to this pattern can be found but are sufficiently rare that, unless a country already enjoys efficient provision from public providers, a forward-looking strategy should not be based on these limited success stories.

#### ***The rural context***

International experience provides clear guidance on the role of government in direct water and sanitation service provision in rural areas: do not make this an element of strategy. Costs are simply too high in relation to local private provision and the willingness or ability of poor people to pay. As a result the facilitating and, possibly, financing roles are the only ones that should factor into a rural water or sanitation Poverty Reduction Strategy.

Poor communities may lobby for direct government service provision. They typically do so in countries with a long history of heavy government subsidies in providing such service. Unfortunately, those services also have a correspondingly long history of low efficiency, wasteful water use, and high service failure rates. They have simply proven unsustainable. In countries where the sector has inherited a government role as a direct service provider, the best strategy will be devolution of control to community groups or private providers. Where that is not possible, government should at a minimum avoid creating further long-term subsidy demands through further system expansion.

#### ***The urban context***

There are a few examples of successful reform of inefficient, publicly run water and sanitation utilities, but failed attempts at such reform are much more common. This fact has led a number of medium-size and large cities to privatize their system operations in recent years. Privatization is not a panacea; examples of badly run private systems can also be found. However, private operation has succeeded in many cases. First, the profit motive compels the utilities to seek operating efficiencies. Lost water means lost revenue and, hence, lost profit. Second, a private utility works under much closer public scrutiny and under regulation from a government that is much readier to criticize and act against a private operator than a public operator. Third, private operators are likely to draw more efficiently on international experience to optimize system performance. In many urban areas, private operators can produce sufficient efficiencies to earn their profit while actually reducing total operating costs. Unfortunately, this does not mean that tariff increases may not be needed. If revenues in the existing system covered only a small percentage of total operating costs, a tariff increase would be needed no matter what type of operator was employed.

The government should make an informed decision as to whether it would be desirable to continue to directly provide water and sanitation services. This decision should be based on the analysis of its

comparative advantage, or lack thereof, in relation to alternatives such as provision by community-based organizations or the private sector:

- *Efficiency.* Do public providers have a record of economic efficiency in line with that of private operators?
- *Financial resources.* Would a shift to private sector or community-based operation bring in more financial resources?
- *Technical capabilities.* Does the private sector routinely use more modern technologies?
- *Managerial record.* Does the private sector or do the community-based operations have stronger managerial records?

Technical note S.7 provides additional detail on how best to allocate responsibilities between the public and private sectors.

#### 23.4.4 Prioritizing government interventions

The history of government intervention in the water and sanitation sector provides clear lessons for the process of pro-poor strategy development. The poor rely much more than others on self-provision or other private solutions. Thus government must first review the institutional and policy environment it creates for such solutions. It must pay special attention to water resources and environmental management, for these determine the quality and quantity of the raw water resource on which so many poor people directly depend. If needed, it must recast other policy to maximize competition and lower administration.

With the policy and institutional review complete, government is in a position to consider the most effective means of using any available fiscal resources. In the case of water and sanitation, this means avoiding blanket service subsidies for water or sanitation. It implies a search for financing mechanisms, such as support for microcredit, that base operations on borrower demand. Experience suggests that direct government provision and management of services should not be a central element of strategy, except in countries already demonstrating highly efficient delivery of such services.

Sections 23.2 to 23.4 have pointed to causes of poverty related to water and sanitation, as well as means to address the constraints faced by the poor. Making use of the information provided in these sections for prioritizing government interventions entails the following step-by-step approach, considering the following elements:

- identifying the location of the poor geographically, in order to better target possible government interventions;
- in parallel, monitoring the proposed linkages between water and sanitation access and poverty dimensions and assessing whether these hold true in the country context;
- assessing the needs of the poor and the constraints they face in accessing services in the priority areas identified in the first two steps;
- identifying options for government intervention that would address the constraints and would cater to the needs of the poor assessed; and
- ranking options based on the numbers of poor benefiting, relative to the degree of benefit, the financial cost, and the political feasibility of realizing the chosen intervention in an acceptable timeframe.

While some options for government intervention that are cost-effective may not be politically feasible in the short term (for example, some institutional reforms), they should not be discarded. A prudent approach to a poverty reduction strategy takes into consideration tradeoffs and designs short-, medium-, and long-term strategies with a menu of different options. These could entail (a) rapid response mechanisms to address the immediate needs of the poor for the short run, and, in parallel, (b) the design of a framework for medium- and long-term policy changes that will set direction for the future.

There is an inherent risk that medium- and long-term policy visions may be hijacked by political considerations. In order to set a Poverty Reduction Strategy on a firm track, current governments may want to pursue irreversible changes requiring the consensus of other political parties, combined with a clear communication campaign to advertise changes to the stakeholders that are affected or benefit from such policy changes.

## 23.5 Monitoring and Evaluation Framework

While improving access to water and sanitation services may in itself be one of the goals of a PRSP, it is more often regarded as a means of achieving goals in other dimensions of poverty. Such goals may include improving health and education, promoting gender equality and social inclusion, and reducing income poverty. In this context, monitoring and evaluation of the poverty impacts of water and sanitation policies require a cross-sectoral approach that fully accounts for the many indirect benefits associated with the provision of water and sanitation services.

As discussed in-depth in chapter 3, “Monitoring and Evaluation,” these are two complementary but different activities. Monitoring involves tracking progress towards agreed on goals and targets, whereas evaluation entails establishing causal links between policy actions and observed outcomes. Both activities are important to measure performance, identify and correct potential problems early on, and improve the understanding of the relationship between different poverty outcomes and water and sanitation policies.

Although many of the concepts and some methodologies are the same, there are important differences between monitoring and evaluation at the project level and at the level of a national strategy. These differences are associated with the scale of the system required, the selection of indicators, data sources, and the objectives of the feedback process. The following sections focus on monitoring and evaluating water and sanitation activities for PRSPs.

### 23.5.1 Monitoring issues in water and sanitation

#### *Selecting indicators*

Monitoring starts with selecting a few key indicators that are relevant to the goals agreed on in the Poverty Reduction Strategy. There is no general rule about the optimal number of indicators; however, it is preferable to select only a few that can be measured well on a timely basis and provide useful information for decisionmaking rather than selecting too many, measuring them badly, and not using them at all. It is important to distinguish between a cross-sectoral core set of indicators for monitoring the overall PRSP from a probably larger and more comprehensive set of indicators for sectoral monitoring.

The selection process would generally consider three broad types of complementary indicators: impact, outcome, and intermediate indicators. Technical note S.8 provides some guidance and examples on the choice of indicators. However, the final selection of indicators should be driven by the specific poverty reduction goals, policy choices, monitoring capacity, and the views expressed in the participatory processes of each country.

**Impact indicators.** Impact indicators measure the final effect of water and sanitation interventions on different poverty dimensions. In particular, they are used to track progress on achieving goals related to improving the health status of the population, increasing education levels, and reducing gender inequities and social exclusion. For health-related goals, mortality rates, malnutrition rates, or waterborne disease incidence can be appropriate indicators. Since children are particularly vulnerable to waterborne diseases, such as diarrhea, which may affect their nutritional status, the above indicators are usually measured in children under five years old. As mentioned above, lack of appropriate sanitation facilities in schools and the time spent in fetching water may be factors hindering progress in education goals, particularly for girls. Therefore, girls’ school enrollment or girls’ educational attainment are alternative indicators for monitoring progress on education, in addition to gender equity goals.

**Outcome indicators.** A combination of measures of use and satisfaction with water and sanitation services is desirable for complementing impact monitoring. These outcome indicators are intended to capture “midway” effects that are generally considered as necessary but not sufficient conditions to achieve final impacts. Ideally, the monitoring system should include indicators such as the percentage of households with a minimum consumption of safe water per capita per day to satisfy their basic drinking, cooking, and hygiene requirements. However, this involves a number of definition and measurement problems.

For example, it requires an agreement on what can be considered as safe water, what is the minimum acceptable level of consumption, and how to measure these. An accurate self-reported measurement of water consumption is difficult to get: typically, relatively few households in urban areas have private connections with individual water meters, and relatively few know how much water they are buying from private vendors. Where people normally haul all of their own water, the best estimate available may be the number of buckets of water fetched daily. It is also costly to perform laboratory tests to obtain an accurate measure of water quality. While routine in the context of urban networked water supply, regular monitoring in rural areas has often proven too expensive to establish.

Ideal indicators may not be good indicators if they are too difficult or costly to measure well. It may be better to use a proxy, such as a measure of access to water, rather than water consumption. Commonly used access indicators include the percentage of households with water supply connections or private tube wells and the percentage of households with access to a public water delivery point within a reasonable distance from the home. It is important to specify the distance or travel time to the water delivery point. As discussed earlier, how far a family has to travel and the queuing time influence the consumption level. What is considered as a reasonable distance or travel time will vary depending on specific circumstances such as climate and terrain conditions—a half an hour travel time under extreme weather conditions or uphill is not the same as half an hour walking on flat terrain in moderate temperatures.

While somewhat easier to obtain, access indicators need to be considered with care. It is important to complement them with measures of quality and user satisfaction. Alternative quality and satisfaction indicators are the percentage of households with continuous water supply throughout the year and the percentage of households reporting satisfaction with water and sanitation services.

As shown in technical note S.1, most countries experience large variations in access to water and sanitation across rural and urban areas. Monitoring indicators, particularly outcome indicators, should be disaggregated at least at the rural and urban level to allow tracking progress in closing the gap between better-off and worse-off areas.

**Intermediate (input/output) indicators.** Variables measured by impact and outcome indicators depend on a multitude of cross-sectoral factors. Many, such as household behavioral responses, are outside government control. Moreover, changes in these variables may occur only in the medium to long run. Thus it is important to complement impact and outcome indicators with intermediate indicators. Intermediate indicators provide information on actions taken and their efficiency level in improving the coverage and quality of water and sanitation services. They measure things that reflect policy changes and are relevant inputs to achieving the agreed on goals. Since it is difficult to find all these attributes in just one indicator, generally the monitoring system would include a combination of measures of investment or expenditure levels in water and sanitation that are pro-poor, some measure of the services generated, and the efficiency of their production as intermediate indicators. Box 23.9 describes a software tool for monitoring utility performance using intermediate indicators.

### **Data sources for monitoring**

Monitoring water and sanitation interventions requires a combination of data sources, including household surveys and administrative data from utilities and other agents engaged in the provision of services. Qualitative data from participatory poverty assessments or other similar studies may also be required. Table 23.4 summarizes the main sources of household data relevant for water and sanitation monitoring (for more information, see chapter 1, “Poverty Measurement and Analysis,” and chapter 3, “Monitoring and Evaluation”).

**Box 23.9. Monitoring Utility Performance**

Most utilities compile some form of performance statistics. The use of these statistics to inform stakeholders of the relative performance of utilities is less well developed. There can be large performance disparities within and between countries, even among those at the same stage of development. Inadequate performance, highlighted by such comparisons, typically reveals that poor performers have low tariffs, poor bill collection, high system leakage levels, and high unit operating costs. The end result is insufficient funds to invest in the systems to provide good quality water and to expand water service coverage, particularly to the poor.

A current World Bank initiative helps client countries measure the performance of their water and sanitation utilities. Called the Benchmarking Start-Up Kit initiative, it comprises a suite of software resources that will allow users to compile a representative set of performance indicators for the sector. The kit includes standard data definitions, computational approaches and presentational methods, and performance indicators on coverage, unaccounted for water, pipe network performance, quality of service, financial performance, water consumption and production, metering practices, cost and staffing, billings and collections, and capital investments.

Baseline data on impact and outcome indicators can be obtained from recent Living Standard Measurement Study (LSMS) surveys or Integrated Surveys (IS), Demographic and Health Surveys (DHS), and the census. Annual monitoring for a number of indicators can be done using information from Priority Surveys (PS) or Core Welfare Indicator Questionnaire (CWIQ) surveys. The monitoring frequency of indicators not included in the CWIQ—mostly health and income or consumption indicators—will vary between three to five years depending on the schedule for LSMS- or DHS-type surveys..

Administrative records can provide useful information for monitoring some indicators. For example, if utilities have effective metering programs, client databases can provide some information on consumption levels. Records kept by public health departments can provide information on water quality. In addition, appropriate government ministries or departments may collect data on service coverage. These data can be a relatively low-cost alternative to collect data for water and sanitation monitoring on a frequent basis. However, they have some drawbacks. They do not provide information on the consumption patterns of informal connections or users without meters. Moreover, unlike other sectors, administrative data relevant for water and sanitation comes from different line ministries and other government

**Table 23.4. Main Data Sources for Monitoring Water and Sanitation Interventions**

<i>Data source</i>	<i>Relevant data for water and sanitation monitoring</i>	<i>Remarks</i>
<b>Census</b>	Collects demographic and socioeconomic information as well as data on access to basic services including water and sanitation.	<ul style="list-style-type: none"> <li>• Information can be highly disaggregated.</li> <li>• Conducted only once every 10 years.</li> </ul>
<b>LSMS/IS</b>	Record detailed data on household expenditures to construct consumption aggregates. They also collect some health indicators such as diarrhea incidence and often include anthropometric measures. For water and sanitation use, they generally ask how much the household has spent on water services, the source of water supply, the average number of hours a day in which the dwelling receives water, and whether there is a sewerage connection.	<ul style="list-style-type: none"> <li>• Comprehensive, nationally representative household survey; allows simultaneous measurement and analysis of various poverty dimensions.</li> <li>• Collection and analysis of information is very time consuming.</li> </ul>
<b>DHS</b>	Provides data for a wide range of population, health, and nutrition indicators, including mortality rates, children nutritional status, diarrhea, and sometimes other waterborne disease incidence. It also collects basic data on socioeconomic indicators, including access to safe water or to a sanitary latrine.	<ul style="list-style-type: none"> <li>• Nationally representative data on health, nutrition, and population.</li> <li>• Interim surveys focused on key indicators are conducted between rounds of full DHS.</li> <li>• No consumption or detailed income information.</li> </ul>
<b>PS/CWIQ</b>	Collects information, ideally on an annual basis, to measure people's access, usage, and satisfaction with selected social and economic services. Relevant information includes access to safe water, type of toilet facility, children's nutritional status, net enrollment rates, and reasons for not attending school.	<ul style="list-style-type: none"> <li>• Quick and cost effective.</li> <li>• Collects limited information; no consumption or detailed income information.</li> </ul>
<b>Qualitative studies</b>	Can provide information on user satisfaction with water and sanitation services and sometimes hygiene behaviors.	<ul style="list-style-type: none"> <li>• Sample size generally too small.</li> </ul>

offices. This requires a great deal of interinstitutional coordination and collaboration to ensure timely availability of all necessary data and makes it more difficult to ensure quality control.

### 23.5.2 Assessing water and sanitation policies and programs

Regular monitoring can be complemented with more in-depth assessments of particular policies and programs. Depending on the methodology applied, these studies can answer different questions of interest such as which social groups are benefiting from public spending in water and sanitation and to what extent changes in well-being indicators can be attributed to a particular policy or program. Two commonly used assessments for water and sanitation are discussed below.

**Impact Evaluation.** As discussed in detail in chapter 3, “Monitoring and Evaluation,” impact evaluations try to determine the causal relationship between policies and programs and observed changes in individual’s well-being. In the water and sanitation context, evaluations have focused mostly on establishing the causality between changes in health indicators, principally diarrhea incidence, and improvements in water and sanitation. Experience in conducting these types of studies is mixed. A number of methodological problems and concerns regarding costs have led to limiting the use of impact evaluations as an operational tool for project evaluation and proposing alternative approaches that look at outcomes such as hygiene behavior rather than health impacts (see technical note S.2).

There are, however, some rigorous attempts to measure health improvements from investments in water and sanitation. Jalan and Ravallion (2001) assessed the impact of piped water on the incidence and duration of diarrhea among children under five in poor families. Another example is the evaluation of the Social Fund in Nicaragua. It assessed the impact of water supply investments and latrine projects on malnutrition (World Bank 2000). Two factors may have contributed to the usefulness and reasonable costs of these studies. First, they drew on existing or ongoing large household surveys, saving much of the costs of creating and implementing a whole new data collection instrument. Second, they applied a methodology recently adapted for evaluation of social programs—propensity score matching—that is generally considered as a second best solution when randomization is not feasible (see chapter 3, “Monitoring and Evaluation”).

**Benefit Incidence Analysis.** Benefit or spending incidence analysis is another common tool for performance assessment. As described in detail in chapter 6, “Public Spending,” benefit incidence analysis examines whether poorer households derive a proportionally larger share of benefits from public spending than do wealthier households relative to the overall income distribution. It helps determine how progressive, regressive, or neutral is the public spending on water and sanitation. Technical note S.5 presents some examples of the use of benefit incidence analysis to assess tariff structures and subsidy schemes.

Benefit incidence analysis can provide useful insights into the social distribution of the benefits of government service provision and spending on water and sanitation and is relatively simple to carry out. However, it has its limitations (see chapter 6, “Public Spending”). The cost of services is used as a proxy for the benefits received from having access to a particular type of service. This, of course, is a crude measure of benefits and fails to consider the ability of different social groups to transform access to the service into improved well-being as measured by, for example, lower mortality rates. Furthermore, government spending used to calculate service costs may not represent the full cost to users. Full costs may also include direct payments to service providers, travel expenses, and the opportunity cost of time lost to productive activities.

### 23.5.3 Using monitoring and evaluating results

A critical issue in monitoring and evaluation is how to use the results and create a feedback process. As shown in figure 23.2, monitoring and evaluation results can be used to clarify further the linkages between water and sanitation and other poverty dimensions, redefine problem areas, and refine the menu of possible public interventions. Diagnostic questions that can be answered by the feedback from monitoring and evaluation results include the following:

Progress in goal achievement:

- Were all the targets set met?
- Were the targets realistic?
- Were there major economywide factors or shocks that influenced the progress in goal achievement?

Poverty linkages:

- Did improvements in water and sanitation access parallel reductions in water- and sanitation-related diseases, especially diarrhea? If not, was improved access to infrastructure accompanied by better hygienic behavior? If improvements in hygienic behavior could be observed without improvements in health indicators, is the water of drinkable quality and available throughout the year?
- Did improvements in water and sanitation infrastructure in schools parallel an increase in children (especially girls) attending classes?

Identification of problem areas:

- Is there evidence that constraints to service access were removed with the help of the chosen set of interventions?

Choice of interventions:

- Who is benefiting from public spending and in what proportion?
- Do the key interventions achieve their intended goal?
- Can the changes in outcomes be explained by these interventions, or are they the result of some other factors occurring simultaneously?
- Does the impact of key interventions vary across different groups of intended beneficiaries (males, females, indigenous people), regions, and over time?
- How effective is a particular policy or program in comparison to alternative interventions? Is the intervention worth the resources it costs?

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