WORLD BANK OPERATIONS EVALUATION DEPARTMENT

Rural Water Projects

Lessons from OED Evaluations

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Preface

This review of World Bank rural water assistance was undertaken by the Operations Evaluation Department (OED) in response to a request from the Rural and Small Town Water and Sanitation Thematic Group (and with the support of its Knowledge Management budget) and because World Bank attention to the infrastructure constraints of the countryside can be expected to increase further, and its impact will be enhanced by maximizing identification of the lessons of past lending.

The study is based on the evaluation results of 15 free-standing water and sanitation projects. It integrates the discoveries of three years of field research into Bank assistance for rural water and combines the findings of rural water Impact Evaluations with recent Performance Audits and Implementation Completion Reports on the topic. The work has also been informed by a review of the branches of the literature that included economic and sector work (sectoral and countrywide studies) and bilateral and multilateral publications. Pilot open-ended interviews were conducted with Bank staff (early in the research process) and staff in borrower agencies were also interviewed. These interviews were supplemented by questionnaires administered to beneficiaries, water committees, pump repairmen, women's groups, and other stakeholders in India, Paraguay, and Sri Lanka. Additional study-related field visits were made to Bolivia, China, Côte d'Ivoire, and Mali. For this study, OED commissioned a team from the IRIS Center at the University of Maryland's Department of Economics to analyze the responses to questionnaires administered in India and Sri Lanka during the study. IRIS produced a scholarly paper that adds to the growing empirical evidence that social capital contributes significantly to sustainable development. This paper, highlights of which are summarized in this volume, is a first attempt to measure and econometrically evaluate how the impact of community-based water services (financed by the Bank) is affected by social capital.

The various building block reports that led to this document were designed as standalone evaluations—it was not originally the intention to produce this volume. However, following the establishment of the networks and the Rural and Small Town Water and Sanitation Thematic Group, it became apparent that sector knowledge management activities would be incomplete without taking evaluation results into account, however incomplete they might be. Reactions and comments to this work are especially welcome because OED intends to undertake a comprehensive analysis of all water-related activities in the near future, and readers' suggestions will inform a more seamless and better designed review that will follow.

Executive Summary

Investments in rural water systems can have a profound impact on the economic activity and the quality of life of the poor. In most developing countries, one or more family members spend a significant part of each day trying to provide enough water for cooking, cleaning, and domestic animals. Personal hygiene is often relegated to infrequent trips to sometimes unsafe bodies of water.

Focused Bank lending for rural water systems has been in place for a little more than 20 years. In the mid-1970s, it became clear that providing each village with a source of clean water would be a more effective way to improve villagers' health than continuing to incur massive expenditures on curative health and hygiene education. Then, the United Nations symbolically directed development agencies' attention (and their investments) to the provision of clean water by calling for an International Drinking Water Supply and Sanitation Decade (IDWSSD, 1980–89).

Since the first free-standing rural water project was approved in fiscal 1978 (Paraguay Rural Water Supply, Loan 1502-PAR), Bank lending to stand-alone rural water supply (RWS) projects has grown steadily. Bank lending in the 1980s was on the order of $334.5 million. From 1990 through the end of calendar 1998 lending for free-standing rural water projects totaled $1,090 million, more than $120 million per year. The lending program for the next two to three years shows a projected further doubling of annual lending. This report gives the background for RWS development from its inception into the 1990s.

The Bank's relatively low level of involvement with rural water projects in the 1970s and 1980s is the result in large measure of the financial challenges inherent in such projects. The Bank's traditional approach is more applicable in urban projects because the presence of better-off families permits cross-subsidization. In contrast, almost all rural dwellers are poor. RWS projects provide rural families with a basic need and often have attractive cost-benefit ratios, but financial viability is often difficult to achieve. Poor families generally find it difficult to allocate the necessary percentage of their income to covering the operating costs of the rural water system. As the Bank has increasingly prioritized attention to the poor, it has expanded its work with RWS, but it has done so overoptimistically, often estimating unrealistically high willingness-to-pay and predicting unattainable levels of cost recovery.

Performance. The outcome ratings of completed Bank-financed RWS projects show a 67 percent ratio of satisfactory performance, above the overall water sector average (which was 60 percent between 1990 and 1996 [the Bankwide average for all sectors combined in 1990–96 was 67 percent], and increased to 67 percent in 1997 and 1998). By implication, therefore, a majority of the projects were found to be *relevant*, *efficacious*, and *efficient*. The RWS projects have been much less successful with *institutional development*—only 43 percent achieved substantial institutional development impact. As the *sustainability* of benefits correlates strongly with substantial institutional development, it is not surprising that the same percentage of the projects were rated likely to sustain their benefits.

Relevance. The overarching goal of the program—to improve the lives of the rural poor by providing access to clean water—has been highly relevant to the Bank's poverty reduction aims. It has also produced significant benefits for women, who often bear primary responsibility for meeting family water needs. The lending program has worked with government donor agencies, the private sector, and nongovernmental organizations (NGOs) to promote and facilitate innovative solutions and participatory approaches to RWS that are tailored to local needs. The program's scope and activities have evolved over the years, but its basic elements—a focus on serving poor communities, concentration on field-based activities, and emphasis on working through partnerships—have remained constant. Individually, the projects have been relevant to the strategies and needs of the client governments and have had considerable impacts.

Efficacy. The projects evaluated have generally had positive impacts on the lives of the rural poor: large percentages of the target populations gained access to safe water they did not have before. Distance and time savings varied significantly for type of water service, the largest gains accruing to those who used a house connection, followed by those using a shared pipe connection or a shared point source such as a handpump well. Beneficiaries, mostly women and children, reported average reductions in walking greater than two kilometers in some projects. Time spent collecting water decreased dramatically where reductions in distance walked were made possible, in some cases up to 80 percent. New systems led to average reductions in collection time of 45-60 minutes in Sri Lanka. These reductions gave women more time to spend on economic activities, education, and other beneficial activities.

Achievements in access produced effects such as increases in daily consumption. In Paraguay, system users enjoyed a nearly 300 percent increase in water consumption. Ability to pay from the outset often affected increases in consumption: those who could easily afford better service before the project benefited less. The Bank-financed efforts, together with parallel undertakings by other agencies, have led to considerable progress on a global scale. Studies done at the end of the U.N. Drinking Water Decade estimated that one billion people obtained water for the first time, and more than 750 million gained access to improved sanitation facilities. In the rural areas of low-income countries, 35 percent of the population still lacks a safe water supply.

In most places studied, there were indications of improved health, although concurrent water activities by other organizations and parallel sanitation and health education make it impossible to attribute all benefits to the increase in consumption and better hygiene made possible by improved water supplies. In China, hepatitis and typhoid declined by 40 percent in Zhejiang province after the project facilities came on stream. Health benefits experienced by users of Bank-financed water systems in India, Paraguay, and Sri Lanka included reductions in the incidence of diarrhea and other diseases. Recent research in India suggests that (water system related) health gains may be greatest for rural families with a house connection. In Paraguay, deaths from diarrhea were seven times more frequent in villages not yet served by Bank-financed systems. Similarly, a Bank-supervised study in the same country found that more than 95 percent of recent (self-reported) stomach distress had occurred in households that had not received potable water through the projects. Whether beneficiaries rely solely on the new system for their drinking water greatly influ-

ences the degree of impacts on health. Reasons for using other, less-safe sources range from lack of information or training to distance to source and social and economic incentives or disincentives.

In most of the projects reviewed, sanitation progress was much slower than water system development. Therefore, the coverage in sanitation remained low, and its potential to improve health conditions is difficult to evaluate. In general, health and hygiene education efforts focused more on water quality and use of water than on sanitation or latrines. Health and hygiene education efforts also proved difficult to compare and even to measure meaningfully. Timing of education efforts was not the same across projects: in some projects education was given before the water was available and in others only after bad water handling habits were already established. Given time and budget constraints, and the fact that what constitutes good practice is still evolving, the study used econometric analysis to demonstrate that the impact of such efforts is positive. Enrollment in a hygiene class is associated with an increase in the probability of improved health, and providing hygiene training as part of the project (or ensuring that hygiene training is provided by other sources) enhances the health impact of the project.

Efficiency. A conservative estimate of the number of people who now have access to a safe water source as a result of the 15 evaluated (Bank-supported, stand-alone, and completed) RWS projects is about 20 million. This figure is based on data contained in project completion documents and OED audits. Of the 14 projects for which the study found coverage figures, the average per capita cost of providing water to rural areas in Bank projects was $53.23 per person and $266.15 per household.

Sustainability. The sustainability of RWS projects correlates strongly with substantial institutional development, particularly the development of local institutions. Keeping a project-built water system operational depends heavily on leaving behind a committee or other local institution that is technically and administratively capable. While some such institutions have thrived over long periods (see next paragraph), RWS projects are not at a point where the survival of community-level water organizations is routine. Rural communities almost always need short-term support to help them attain operation and maintenance (O&M) proficiency. Projects that depend on community management need to fund support for local groups until they can perform all of their functions without further assistance. The required assistance evolves, but it usually has three phases: preconstruction community organization, including rules development; construction monitoring and supervision; and O&M and management assistance until the village can function independently.

Institutional Development Impact. Institutional development in RWS projects tends to be difficult, and Bank-financed projects had varying levels of success developing the local institutions that are essential for sustainability. In Paraguay, where adequate time and effort were dedicated to the task, 424 local organizations were established to operate water systems during a period of more than 20 years, and not one of them became moribund. In other projects, the story is very different. Implementers usually come up against excessive complexity of the institutional framework, low organizational capacity at the village level, and weaknesses in the NGO sector. Invariably, achieving effective institutional development requires close attention to the characteristics of the villages being served and adaptation of project design to these realities.

Four Lessons of Experience

Past performance does not determine future results. The Bank has engaged in a very effective learning process; a series of evolving approaches to RWS have helped to overcome the mistakes of the past. And the Bank is working in some new ways that are so recent that results, although promising, are not yet conclusive. The Community Water Supply and Sanitation Conference held at the Bank in May 1998 supported a new framework for sustainable community planning and management of village systems (the Demand-Responsive Approach, or DRA). To some degree, ongoing rural water projects using DRA are structured differently from the completed ones OED studied. Unfortunately, there are no completed DRA projects to evaluate at this stage. Nevertheless, a backward look at about half of all completed projects sheds light on the nature of the challenge that these new RWS projects will face as they encourage even more local involvement with management and design. Some of the new rules by which DRA projects are implemented are consonant with the study findings. For this summary, study findings have been grouped into four main lessons, as follows:

Lesson 1: A longer-term presence than was generally provided for under most projects is required to leave behind an organization that can maintain the water point or piped system or both, administer the water scheme in a financially responsible manner, and handle routine O&M.

In other words, it is easier to construct a water system than to leave in place a local organization capable of technically and financially managing it. Commonly, the responsibility for RWS resides with a large number of public institutions that in turn are supervised by multiple ministries. Rural communities always have the potential to manage at least some aspects of service delivery, but running a water system is a new activity for most of them, and they almost always need short-term support until they achieve proficiency. NGOs are often financed under Bank projects (and by other donors) to be the support organizations that help local leaders learn to operate their water systems. In general, the small NGOs that work well at the village level have little experience with large-scale projects implemented over a wide area. Making this complex network of actors and interactions function effectively is invariably more time-consuming than anticipated.

Lesson 2: The lack of proper attention to institutional development means that governments must return to beneficiary communities to rehabilitate what they have provided.

Even though rural water projects have made great strides in getting villagers to cover more of their systems' operating costs, nowhere in the world did the study find a majority of beneficiary communities ready to cover the costs of a major overhaul or the complete replacement of their systems' most expensive components. And only in China was there full cost recovery. In most of the countries studied, if communities raise tariffs to cover equipment replacement at too late a date they would be inordinately high, which would likely drive people back to traditional sources. Some countries have developed the "water fund" idea to support communities with this type of problem. In other countries, a policy based on designed lifespans has been used.

Lesson 3: Rarely will one level of service meet all village needs.

RWS projects should treat villages and small towns (population of more than 2,000) differently. Villages and towns often aspire to service of different standards. In recent years, aspirations have steadily risen, even in very poor countries. Whereas rural villages are often quite dispersed and improved point sources may be in line with local aspirations and willingness-to-pay, small towns lend themselves better to motorized, piped systems. People in small rural towns have little incentive to participate in water-providing local organizations if the service they are going to receive does not meet their aspirations. There is also a financial justification for respecting local willingness-to-pay when the community wants to aim high: under many projects' rules there is a chance that government subsidies will be lost by waiting. Maximizing house connections and yard taps (based on felt needs and real demand, of course) fulfills community aspirations and creates the possibility of collecting enough money through fees and tariffs to attract a private operator. If that is not feasible, higher service levels permit sustainable community ownership or make the continuing existence of a local water committee worthwhile. Realizing the full potential benefits of RWS investments will require cataloging local differences and matching services to meet them as necessary. However, house connections are going to remain a dream for most rural dwellers in Africa because funding the initial investment is a bottleneck for most governments.

Lesson 4: To improve project outcomes, Bank-financed interventions have to be carefully adapted to the social characteristics of each village served.

Just as no single level of service can meet the aspirations and budgets of all villages and villagers, having but one approach to local institutional capacity development is not enough. The strongest and weakest village organizations in each project studied are separated by a large gap. The biggest difference between highly successful village water service-providing institutions and less successful ones is income, a result of tariffs being greater than costs. But even before the various villages had water organizations, the chances are good that they had differing levels of social capital. While recognizing and applauding the current Bank commitment to financially sustainable RWS, it is a goal that should be approached incrementally. The study found that even the minimal costs associated with current community-based and demand-responsive projects are too high for a subset of the target population. Raising water prices in order to improve cost recovery would probably cause more families to drop out and could potentially leave revenue levels much the same.

Water supply systems are more likely to be sustainable, and subsidies to yield a better result, in better-organized villages. In villages with low levels of social organizational capacity (social capital), support may be required for activities that precede water work before the community can make good use of a water subsidy. Practitioners widely agree that villagers who use a rural water system must be responsible for its O&M costs. In the sample studied, increased participation of villagers in the operation of the system usually reduced levels of subsidy, but it did not eliminate them. Therefore, governments should differentiate between villages with high and low levels of social capital and begin work with each one in a more carefully tailored fashion, making sure that they know how to participate effectively (keep books, run meetings and elections, handle correspondence and other contacts with public officials, etc.) in a service-providing organization before insisting on entrepreneurial management.

Abbreviations and Acronyms

CWSS	Community water supply and sanitation
DNHE	Direcion National de l'Hydraulique et de Energie (National Directorate of Water Resources & Energy in Mali)
DRA	Demand-responsive approach
EMAMA	Enterprise Malienne de Maintenance
FINNIDA	Finnish Ministry of Foreign Affairs, Department for International Development Cooperation
IDWSSD	International Drinking Water Supply and Sanitation Decade
IER	Impact Evaluation Report
KWA	Kerala Water Authority
lcd	Liters/capita/day
M&E	Monitoring and evaluation
MOH	Ministry of Health
NGO	Nongovernmental organization
NWSDB	National Water Supply and Drainage Board
O&M	Operation and maintenance
OED	Operations Evaluation Department
RWS	Rural water supply
SENASA	National Environmental Sanitation Service
U.N.	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VLOM	Village-level operation and management of maintenance
WSS	Water supply and sanitation

Chapter 1

The Global Effort and the Bank's Role

The Nature of the Problem

In his October 8, 1996, Annual Meeting Statement, World Bank President James Wolfensohn committed the Bank to a strategy that gives high priority to the rural areas. In the countries where water is the most scarce, such as the Sahel countries and parts of India, one or more members of each family needs to spend a significant part of the working day to ensure that the household has enough water for cooking, dishwashing, and domestic animals. Personal hygiene often needs to be relegated to infrequent trips to (sometimes unsafe) bodies of water. In terms of economic and quality of life impacts on the lives of the poor, investments in rural water and sanitation systems have few rivals.

On a per capita basis, investments in rural water can be particularly cost effective. The per capita cost of rural water systems is usually much less than that of urban systems. The necessary infrastructure, purification, and service standards for urban water systems differ quite substantially from those in rural areas, however. Serving large urban populations usually requires tapping expensive and distant sources in order to meet a geographically concentrated demand, urban users consume water at much higher levels than rural villagers, and long runs of large diameter pipes are costly. The more concentrated the population (in already-built areas), the more critical and expensive sanitation becomes. Conversely, thinly populated areas can handle sanitation in very simple and inexpensive ways. Each dollar spent on a rural water system provides approximately four times the population coverage afforded by an investment in an urban water system. Per capita costs of water are largely a function of density and they suggest a "U" relationship: the densest cities and the most remote and sparsely populated areas are the most expensive to serve. Per capita costs for very small populations in isolated and difficult to work areas can exceed urban cost levels under exceptional circumstances. In Maharashtra, the piped system for Salgara had a per capita cost of $17, while a similar system in harder-to-serve Walipur cost $126 per capita. However, per capita costs in difficult-to-serve urban areas can also be high, depending on conditions and what is required to pipe water into convoluted slums on rocky terrain with no streets and poor drainage. In one extreme example, the cost per person to supply a *favela* in Rio de Janeiro with water was $409.

Of course, safe water has health impacts as well, but supporting activities are required before all the potential benefits of a system can be fully realized. Maximizing health improvements requires simultaneous hygiene education and (in piped systems) constant water pressure in the network and (especially in handpump systems) safe ways to carry and store the household supply. Even then, in the absence of sanitation improvements, health benefits can be diluted. People travel to market and migrate to employment. Often they bring back to their

community diseases that mask the potential of water improvements that would otherwise be credited with creating a safer environment. Documenting health benefits is also difficult. Epidemiological studies are expensive (leading to a trade-off between serving more people with water or studying benefits more precisely) and time-consuming. Also people tend to confuse the frequency and severity of health problems after only a few weeks' time—contraindicating the use of self-reported health data for *quantifying* longer-term trends.

The level and nature of demand for water in rural areas varies greatly in response to local circumstances. Demand is usually first and foremost a convenience issue—that is, the distance from the home to the source is perceived as excessive (or periodic drought increases the distance to an uncomfortable degree). When distance shrinks, and partly in response to health and hygiene education, villagers demand higher consumption levels and, usually subsequently, better quality of water. In most of the projects reviewed under this work, sanitation progress was much slower than water system development. Even though health and hygiene education efforts generally focused on water quality and use of water, meaningfully comparing such efforts proved difficult, and even measuring their achievements was a challenge. For some projects, number of courses given and number of beneficiaries attending are all that is available. Even when respondents noted that they had received training, it was generally not possible to compare the quality of this education or even to know that it took place within the ambit of the Bank-financed project. Timing was also not the same: in some projects education was given before the water was available and in others only after. Given time and budget constraints, and the fact that what constitutes good practice is still evolving, the study was able to do little other than to show that the impact of such efforts is positive. Lessons on good practice and differential impact according to training approach will doubtless come from subsequent work. Some findings from evaluations of selected projects are presented below, however.

The Bank and many other aid donors have strongly supported the development of rural water systems because the lack of a reliable source of potable water is a health-threatening matter in most developing countries, and its presence (once minimal nutrition levels can be reached) is the essential precondition for health and hygiene improvements. This review of OED-evaluated rural water assistance was undertaken in response to a request from the Rural and Small Town Water and Sanitation Thematic Group (and with the support of its Knowledge Management budget) and because Bank attention to the infrastructure constraints of the countryside can be expected to increase further, and its impact will be enhanced if as many lessons as possible from past lending have been identified.

Global Framework

Focused Bank lending for rural water systems has been in place for just a little more than 20 years. In his keynote address at the 1973 World Bank Annual Meetings in Nairobi, President Robert McNamara called for a focussing of Bank resources and energies on the rural poor: "Without rapid progress in smallholder agriculture throughout the developing world, there is little hope either of achieving long-term stable economic growth or of significantly reducing the levels of absolute poverty." One of six essential elements in this new rural plan was "assured availability of water."[1]

In the mid-1970s, a meeting of minds occurred in the development community. Despite massive expenditures in curative health and hygiene education, it was becoming clear that the most effective way to improve villagers' health was to ensure that there was adequate clean water in each village. Like the development of oral rehydration therapy—which dramatically improved children's survival rates in a few years all around the world—this realization proved to be a conceptual breakthrough in international development. The message was so important that it inspired the United Nations to symbolically direct development agencies' attention (and development investments) to the significance of clean water by calling for an international decade. The U.N. sponsored IDWSSD, 1980–89, also concentrated the Bank's attention on rural water. Since the first free-standing rural water project was approved in fiscal 1978 (Paraguay Rural Water Supply, Loan 1502-PAR), the Bank's lending volume for the subsector has been increasing dramatically.

Despite spectacular progress largely concentrated in Asia, the majority of rural villagers still do not have improved access in many countries. Notwithstanding considerable achievements since the onset of the IDWSSD in 1980 20 years later, levels of coverage are still short of the decade's targets of universal service coverage of safe water supply and adequate sanitation. In 1982, only 39 percent of the rural population in low-income countries had access to safe water, according to the 1999 *World Development Indicators*, while in 1995 it was 65 percent. Only about 35 percent of the rural population in Africa has an adequate supply of water.[2] Table 1.1 presents the achievements in rural water service coverage to date. Rural dwellers lag behind their urban counterparts in water and sanitation coverage globally, although their situation is improving. While water coverage in developing countries in 1990 was 61 percent for all populations (combined rural and urban), it was only 50 percent for the rural areas of the world. Massive catching up occurred by 1994 as rural coverage in developing regions reached 70 percent. The results are less encouraging for the related issue of sanitation service coverage, which fell between 1990 and 1994 from 36 percent to 34 percent.[3]

Table 1.1 Rural Water Supply Coverage by Region 1990–94

	1990 (Population in Millions)				*1994 (Population in Millions)*			
	Total Pop.	*Pop. Served*	*Pop. Unserved*	*% Coverage*	*Total Pop.*	*Pop. Served*	*Pop. Unserved*	*% Coverage*
Global	2682	1342	1340	50	2789	1953	836	70
Africa	432	153	279	35	468	173	295	37
Latin America and the Caribbean	126	64	62	51	125	70	55	56
Asia and Pacific	2097	1108	989	53	2167	1690	477	78
Western Asia	27	17	10	63	29	20	9	69

Note: The report attributes the sharp increase in global rural coverage to the large increase in Asia and to the shift of population growth from rural to urban areas. (Rural population in Asia and the Pacific increased 3 percent between 1990 and 1994, while urban population grew 15 percent in the same period.) The authors of the report also note that their data come from governments whose measurement tools, coverage, and capacity may change significantly in any given time period.

Source: Water Supply and Sanitation Sector Monitoring Report (1996). World Health Organization, Water Supply and Sanitation Collaborative Council, and United Nations Children's Fund.

In the design of a strategy to supply rural areas with safe water and adequate sanitation, the relative shares of agglomerated and dispersed population are important, as are expressed community preferences and local income levels. For agglomerated rural population, piped water supplies with at least a rudimentary distribution system are cost-effective. In contrast, for rural dispersed population, protected wells with handpumps may be the only affordable option.

After years of uncoordinated donor activity in the water and sanitation sector, in 1978 the United Nations Development Programme (UNDP) and the Bank launched the first global project to address water and sanitation issues. Originally conceived of as an applied research project aimed at supporting IDWSSD efforts, the program is now in its twentieth year and has proved to be an influential experiment in development partnerships. The program works with government donor agencies, the private sector, and NGOs to promote and facilitate innovative solutions and participatory approaches tailored to local needs and conditions.

In the past, the program has focussed on projects such as extensive field testing of handpumps and promoting ventilated, improved pit latrines. Over the past few years, the program has shifted its focus toward more facilitative approaches capable of responding to changing client demands. Accordingly, its recent activities have included the publication of a six-country study analyzing the impact of demand-responsive approaches on the sustainability of rural water systems and increased use of media such as video and the Internet to facilitate learning and sharing of program- and sector-related activities and experiences among partners and clients at all levels. The program's scope and activities have evolved considerably over the years, but its basic elements—a focus on serving poor communities, concentration on field-based activities, and emphasis on working through partnerships—have remained constant.

The Bank has historically been a reluctant supporter of RWS programs. It assigned staff to work exclusively on rural water lending only in 1997. Nonetheless, the Bank has been increasingly active in RWS programs in developing countries (in dollar terms), although projects were few in number until relatively recently (Annex A). The Bank's relatively low level of involvement with rural water projects in the 1970s and 1980s results in large measure from the financial challenges inherent in such projects. The Bank's traditional approach is more applicable in urban projects because the presence of better-off families permits cross-subsidization. In contrast, almost all rural dwellers are poor. RWS projects provide rural families with a basic need and often have attractive cost-benefit ratios, but financial viability is often difficult to achieve. Poor families generally find it difficult to allocate the necessary percentage of their income to covering the operating costs of the rural water system. As the Bank has increasingly prioritized attention to the poor, it has expanded its work with RWS, but it has done so overoptimistically, often estimating unrealistically high willingness-to-pay and predicting unattainable levels of cost recovery.

Chapter 2

What Has Bank Support Achieved?

Since the mid-1970s, when the Bank began to support RWS services, much has been accomplished. Just during the years of the U.N.-sponsored international decade, one billion people obtained safe drinking water through a combined public-private effort.[4] The outcome ratings of the Bank-financed RWS projects completed as of December 1998 (Table 2.1) show a 67 percent ratio of satisfactory performance, spearheading the continuing improvement in the overall water sector. From 1990 to 1996, the percentage of sector projects that were rated satisfactory averaged 60 percent, while in 1997 and 1998 that average increased to 67 percent. Rural water projects have, however, been much less successful with institutional development—43 percent achieved substantial institutional development impact. Not surprisingly, evaluators have found that the same percentage of the projects, 43 percent, were likely to sustain their benefits.

Achievements on the global level manifest themselves in a variety of ways at the project level. Achievements in access, for example, produced effects such as increases in daily consumption of water, which in turn produced other impacts in health and economic standing. In Paraguay, system users enjoyed a nearly 300 percent increase in water consumption, compared to those that carried their water from shared sources, and a 153 percent increase in water consumption in comparison to those who bought water from vendors. In this case, ability to pay from the outset of the project affected increases in consumption: those who could afford better service before the project benefited less. In Sri Lanka, 55 percent of households that previously relied on spring water reported increases in consumption of as much as 17 liters/capita/day (lcd). In Karnataka, of the households that reported improved health to the impact evaluation survey teams, 70 percent noted that their family had increased its daily consumption of water. Consumption averaged 11 lcd for project-supplied service users. Simple numeric calculations suggest that the elasticity of water use with respect to time would be about –1.

The Bank-financed efforts, like parallel progress by other agencies, were a success, and considerable progress has been made. While the Water Supply and Sanitation (WSS) deficit has been reduced by 38 percent (see Table 2.1), much remains to be done. To further reduce the deficit, accelerated efforts will be needed.

Relevance

The overarching goal of the program—to improve the lives of the rural poor by providing access to clean water—has been highly relevant to the Bank's poverty reduction aims. The lending program has worked with government donor agencies, the private sector, and NGOs

Table 2.1 OED Ratings of Completed Rural Water Supply and Sanitation Projects

			Rating		
Country	*L/C No.*	*Project Name*	*Outcome*	*ID Impact*	*Sustainability*
Paraguay	L1502-PA	Rural Water Supply I	Satisfactory	Not Rated	Not Rated
India[a]	C1046-IN	Rajasthan WS&S	Unsatisfactory	Modest	Uncertain
Paraguay	L2014-PA	Rural Water Supply II	Satisfactory	Substantial	Likely
Tunisia	L2134-TN	National Rural Water Supply	Satisfactory	Substantial	Likely
Philippines	L2206-PH	Rural Water Supply	Unsatisfactory	Negligible	Uncertain
Zambia	C1362-ZM	Rural Water Supply	Unsatisfactory	Negligible	Unlikely
Mali	C1431-ML	Water Supply I	Satisfactory	Moderate	Uncertain
China	C1578-CN	Rural Water Supply I	Satisfactory	Substantial	Likely
Brazil	L2532-BR	Pilot Rural Water and Sanitation	Unsatisfactory	Negligible	Unlikely
Burundi	C1625-BI	Water Supply Sector	Satisfactory	Substantial	Likely
India[a]	C1622-IN	Kerala WS&S	Satisfactory	Partial	Likely
Philippines	L3242-PH	Water Supply/Sewerage/Sanitation	Satisfactory	Substantial	Uncertain
India	C2234-IN	Maharashtra Rural Water Supply	Unsatisfactory	Moderate	Uncertain
Paraguay	L3519-PA	Rural Water Supply III	Satisfactory	Negligible	Likely
Sri Lanka	C2442-CE	Community WS&S	Satisfactory	Substantial	Uncertain

Note: Excludes Kenya Rural Water Supply I, 1637-KE, credit of $20 million, because the project was not successfully completed.
[a] Predominantly rural, but with some peri-urban components.

to promote and facilitate innovative solutions and participatory approaches to RWS that are tailored to local needs. The program's scope and activities have evolved over the years, but its basic elements—a focus on serving poor communities, concentration on field-based activities, and emphasis on working through partnerships—have remained constant. Individually, the projects have been relevant to strategies and needs of the client governments and have had considerable impacts. In dollar terms, only about 51 percent of Bank lending in rural water activity was invested in projects rated as having satisfactory outcomes. When project design is based on a systematic approach to sector strategy, as in Paraguay, projects tend to have better outcomes. Another example of repetitive projects is the Philippines, where outcome has improved from the first project to the second.[5] Although these evaluation results, especially the outcome ratings by project, are generally positive, a closer look at some project details reveals serious problems.

Efficacy

The Bank-financed projects studied generally had positive results: large percentages of the target populations gained access to safe water they did not have before. Distance and time savings varied significantly for type of water service, the largest gains accruing to those who used a house connection, followed by those using a shared pipe connection or a shared source. The limitations on project effectiveness were varied and sometimes unpredictable (Box 2.1).

In the three Paraguayan projects, 85–90 percent of the population in 292 villages served gained access to improved water. While there are technical reasons why a few families in

Box 2.1. Factors That Limit Project Efficacy

A factor that limited the beneficiaries' use of safe water in Mali was that they did not like the taste of water from the new source. Many families had become accustomed to the more complex taste of contaminated surface water and claimed that the water from the handpumps was unpalatable. Another factor that limited the access improvement for some villagers was ease of use. The families who lived closest to the water points used the handpumps most regularly. Families who found the time and distance involved in hauling water from the pumps to be excessive continued to use traditional sources. In several villages, pumps had been installed adjoining the compounds of powerful families. These families sometimes used their power within the village to claim ownership of the water point, chaining the pump so that others could not use it or limiting access to friends, relations, and those who were willing to pay.

every village cannot be served, and a few others can afford to provide themselves with comparable service, most of the unserved 10–15 percent are the poorest families in each village, people who cannot afford to pay the prevailing tariffs. Before the project, access to water was usually limited to surface sources and shallow wells of questionable reliability. Nationwide, only 5 percent of rural inhabitants had access to safe water before the first loan in 1977. After 20 years of work under three successive loans, many villages have nearly 100 percent coverage and nationally coverage has increased to 20 percent. A fourth loan expects to provide new coverage to an additional 300,000 people, but the percentage impact will, as always, be constrained by population growth during the period. In the Indian state of Karnataka, a Bank-financed project made a smaller but still significant contribution to providing rural dwellers with access to improved water 65 percent of the randomly selected families in the villages surveyed said that they were receiving improved service. The original coverage target for this project was 100 percent in these villages—60 percent through public standposts and 40 percent through house connections. Suboptimal improvements in access following the introduction of new systems can be partly explained by social barriers within communities. A social barrier unique to the Indian projects is caste. While this is an emotionally charged issue, in many villages the various water points are one-caste only. The lower castes do not usually receive equal treatment.

Handpump systems theoretically can provide total coverage, but in practice, partly because planned additional units do not get installed, it often does not turn out that way. In both Mali and Côte d'Ivoire the study found less than 100 percent coverage.[6] In Mali (Credits 1431-MLI and SF7-MLI), time proved to be a limiting factor. At completion, the project was able to provide 228,000 people with 628 water points. Upon considering the impact of this achievement, the study team found that, on average, 363 people share the use of each handpump and, because of the nature of their daily tasks, each family tends to want to draw water at about the same time of day. About 20 liters of water per person is the maximum allotment of water possible (see Table 2.2), but this is feasible only with optimal scheduling, which would normally be precluded by the villagers' agricultural and other tasks. The present level of coverage is far from ample, and existing constraints almost ensure that the entire population does not yet have sufficient access to clean water.

Table 2.2 Water Availability (Mali Project)

Number of villagers/pump	363
Pump discharge rate (SAR)	0.7–1.0m^3
Hours per day handpump normally used	14
Gross availability	10–14m^3
Net availability (75% of gross)	7.5m^3
Maximum water/person/day possible	21 liters

In all countries studied, people living farthest from the water points (handpumps or standpipes) tended to use them least. Reductions in the distance from homes to water sources greatly increased the use of the new source. Significant reductions in distance, 80–90 percent, were made in several Indian states and Sri Lanka. In Karnataka, beneficiaries reported average reductions in walking from 2.5 kilometers to 280 meters—even greater than a similar project in Maharashtra, where beneficiaries reported reductions in walking from 2.4 kilometers to 330 meters. In Sri Lanka, distance walked correlated with increased consumption: for those who increased their consumption, reductions averaged 112 meters; for those who did not increase their consumption, reductions averaged 80 meters.

Understandably, time spent collecting water decreased dramatically for areas where reductions in distance walked were made possible by the installation of new facilities. In Karnataka, the average time spent collecting water decreased from around 6 hours to about 1 hour per day—an 80 percent reduction. Maharashtra villagers also reported reductions in average time spent (138 minutes). Similar results (not quantified because of small sample size) were reported in Rajasthan. As for Sri Lanka, data indicate that time spent collecting water was reduced by 64 minutes as distance to the source was shortened. Households that obtained water from a house connection or yard tap on average saved 87 minutes per day. Similarly, households that collected water from shared pipe connections or a shared source on average saved 47 or 25 minutes, respectively. In Mali, women reported that reductions in distance walked gathering water made more time for performing other tasks.

Efficiency

The evaluated RWS projects provided a source of safe water to about 20 million people (see Annex B). This number is based on project completion documents and OED audits of 14 of the 15 completed projects in the portfolio (and does not take into account the 34 projects listed in Annex A that had RWS components). Of the projects for which the study found numbers reporting coverage, the average per capita cost of providing water in Bank projects was $53.23 per person.

When projects help villagers to develop RWS services, improvement can be expected in several areas:

- The number of villagers with access to this better quality water increases or the percentage of inhabitants that receive higher levels of service goes up.
- The distance walked to collect water is measurably reduced (compared to before the project).
- The time spent collecting water is reduced.
- Patterns of water consumption (lcd) change. The increase in consumption should vary, depending on the ease with which water can be obtained after the project compared to the difficulty of obtaining it before the project.

Of course, these outcomes will be constrained if there are social or other barriers to access.

Institutional Development Impact

Based solely on the ratings in Table 2.1, satisfactory outcome is related to positive progress on institutional development—such progress being defined as achieving a minimum rating of moderate—which in turn increases the chances of sustainability of benefits being likely. A review of implementation experience makes this pattern more understandable. As subsequent chapters will show, Paraguay is an interesting case where follow-on and repeater projects, based on a solid foundation of positive progress in the first project, eventually led to sustainable sector operations. The India experience, in contrast, shows how difficult and complex the process of introducing community involvement can be. Sri Lanka (the OED work informing this study is an Impact Evaluation of an ongoing project) is another example where early preparation of a project through a pilot operation can prepare the community and the support organizations (in this case NGOs) to work together and achieve positive results.

Institutional development in RWS projects tends to be difficult. Implementers usually come up against the following: excessive complexity of the institutional framework, low organizational capacity at the village level, and weaknesses in the NGO sector. Commonly, the responsibility for RWS resides with a large number of public institutions that in turn are supervised by multiple ministries. Rural communities always have the potential to manage at least some aspects of service delivery, but running a water system is a new activity for most of them, and they almost always need short-term support until they achieve proficiency. NGOs are often financed under Bank projects (and by other donors) to be the support organizations that help local leaders learn to operate their water systems. In general, the small NGOs that work well at the village level have little experience with large-scale projects implemented over a wide area. If they have to hire new staff in order to cover the large number of communities covered by a Bank-financed project, they encounter difficulties finding people with relevant experience or adequately training and supervising recent university graduates—the type of people they often prefer to hire, even though village leaders are usually more effective. Given these challenges, careful preparation is needed. Involving the support organization in the earliest planning efforts, and conducting pilot activities on a small scale prior to a large-scale investment, can allow NGOs to grow enough in staff and experience to be successful.

The sustainability of benefits correlates strongly with substantial institutional development (discussed below). In one case, a project in the Philippines, sustainability was uncertain although institutional development was rated substantial. This exception is explained by two facts. First, capacity-building efforts were applied only to about one third of the (*barangay*) water works and sanitation associations (although, where applied, they had been successful) in this multiagency, geographically spread-out sector project. Second, cost recovery efforts generally resulted in some improvements, but overall they did not fully attain their goals. In India (Maharashtra project), cost recovery was the key area where the project failed, thus causing the uncertain rating for sustainability—institutional development was only moderate.

Sustainability

System administration, operation, and maintenance proved to be the main determinants of local institutions' sustainability. It is far easier to construct a water scheme than it is to leave in place a local organization capable of technically and financially managing a water system. In

Box 2.2. Village-Level Operation and Management of Maintenance Pumps Are One of the Great Development Success Stories

In the 1987, *Community Water Supply: The Handpump Option*, an influential UNDP-World Bank publication, the authors note: "In Africa, as in the rest of the developing world, the great majority of the rural and urban-fringe population lack safe water and proper sanitation. Many community water supply systems built with foreign aid lie abandoned because they cannot be maintained. Scarcity of capital resources, a shortage of skilled people, and poorly developed organizational structures hinder progress."

Early Bank projects that focused on wells, like similar NGO and bilateral RWS projects, were highly unsuccessful because capital and recurrent costs were too high, and the handpumps were too complex for the villagers to maintain. Usually, the handpumps were not sturdy enough for use by population units larger than a family; spare parts were not available or available only in areas too removed to be accessible; and technical support and competent repair were unavailable. A 1994 Bank-financed water study (that, among other things, looked at the state of the handpumps installed in Mali by international donors and NGOs) found that in the three regions analyzed, the best region had an average of 51 percent of pumps in good operating condition, the worst region about 41 percent.[7]

Under the UNDP-World Bank Water and Sanitation Program, five years of testing and monitoring thousands of handpumps in 17 countries contributed to a database on handpump durability. Once the best-performing models were identified, projects focused on just a few brands, greatly simplifying maintenance and the provision of training and spare parts. As a result, recent Bank projects using handpumps in rural areas have made it much easier for villagers to keep the handpumps in service. One study of six large donor-financed hand pump projects in Mali found that the Bank-financed project had the highest percentage of pumps in operational condition since project inception.[8] The study found that several other donors had far lower rates of sustained operation than the Bank's project.

The solution to the technology problems of the past is the concept of VLOM (Village-Level Operation and Management of Maintenance). Now recognized as one of the fundamental principles of handpump design, VLOM seeks to avoid the high cost, long response time, unreliable service, and operational difficulties in the repair of handpumps through central maintenance systems. Guidelines for VLOM pumps require ease of maintenance: they should be designed in such a way that replacement of wearing parts can be carried out by a village caretaker with only a minimum of training and with only a few basic tools. Non-wearing parts should be able to resist abuse, vandalism, climatic conditions, and the attentions of animals. Under this successful approach, maintenance of the pump is a village responsibility, and pumps are selected with villagers' relatively low level of technical skills in mind.

this area, the UNDP-World Bank Water and Sanitation Program has carried out a successful program to improve the maintenance and longevity of hand pumps (Box 2.2).

Long before local organizations take over the full operation of their schemes, there are clear indications of how ready they are to do so. The availability of tools and spare parts is critical. The degree to which a local group exercises its responsibilities during construction (monitoring its members' work, their financial contributions, and the construction materials is perhaps the most important indicator of actual management capacity, and ability to respond to service interruptions is another aspect that warrants close attention. Local groups almost always find it easier to collect water service charges than to establish a tariff that reflects their true cost of operations. Routine maintenance of mechanical components was another huge challenge, one not made less troublesome through the use of private sector service providers. The timing and manner in which responsibility was transferred from the government to the local water committee have ramifications for billing, collection rates, and daily O&M.

Chapter 3

What Has the Impact Been?

The evaluated water projects had a broad range of impacts on their beneficiary communities. The study reviewed data on health improvements associated with the introduction of safe water. It also looked at the social impacts on the communities of having new or strengthened water-service providing organizations functioning in their midst. If there were indicators that improved service improved the lives of the rural poor, these were catalogued. In some instances, the introduction of water systems had an impact on the density of settlement or the price of land. Attention was also given to the nature and intensity of the training provided and its impact. All of these aspects are discussed below.

Health Impacts

Health benefits experienced by users of Bank-financed water systems in Karnataka, Kerala, Maharashtra, Paraguay, and Sri Lanka included reductions in the incidence of diarrhea and other diseases.

The study reviewed Paraguayan Ministry of Health data for a 10-year period and compared hospital visits for five villages that had received potable water through the project with five others that had not: deaths from diarrhea were seven times more frequent in unserved villages. Similarly, a Bank-supervised study in the same country of 150 villages found that more than 95 percent of recent (self-reported) stomach distress had occurred in households that had not received potable water through the projects.

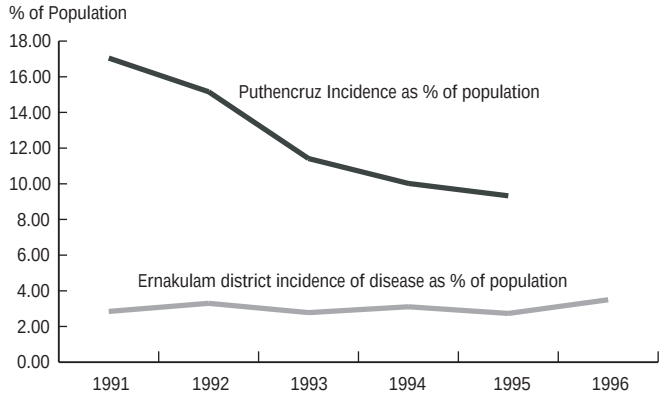
In both project villages and the various districts in the Indian state of Kerala, deaths from water-related disease are declining (Box 3.1). However, the incidence of disease (number of occurrences) is also declining in the project villages, while it is not declining in surrounding areas. The study team obtained statistics on the incidence of water-related diseases for five of the seven rural project areas.[9] The rural local government units (panchayats) of Puthencruz and Vilappil—which were chosen to participate in the project during prepa-

Box 3.1. Water Security in Kerala's Alkkaranad Panchayat

The village of Alkkaranad normally can provide itself with safe water. Most villagers have shallow wells near their homes that provide ample water given average rainfall. In 1991, a severe drought dried up local wells. This forced villagers to use increasingly questionable sources of water, and the incidence of diarrhoeal disease rose considerably. By summer, almost all local water resources were used up, and water had to be trucked in to all nine wards of the panchayat. Following the commissioning of the Bank-supported system, emergency measures on that scale have not been needed.

Cases of water-related stomach problems have declined markedly within the panchayat. From a high of 8,613 reported cases of diarrhea (requiring medical attention at health posts reporting to the district medical officer), the 1995–96 data showed that only 1,591 persons were similarly afflicted.

Figure 3.1 Puthencruz and Ernakulam District Comparison: Incidence of Waterborne Disease as a Percentage of Population 1991–96



ration in the early 1980s because existing water sources were poor in quality and reliability (and they had more than a decade of worse-than-average health problems)—showed the greatest improvement. In fiscal 1992, in the Puthencruz villages for which data were available, about 17 percent of the rural population was afflicted.[10] By fiscal 1996; following three to four years of using safe water, the percentage of the afflicted population came down to almost 9 percent. Between fiscal 1992 and fiscal 1996, the incidence of disease declined at a rate of 15 percent in the project area. Taking into account the increase in population in the project area, the rate of decline rises to 16.2 percent (see Figure 3.1).[11] Both before and after numbers are much higher than the overall state average of less than 4 percent annually. In Vilappil, although the percentage of population affected did not decrease as rapidly as in Puthencruz, the data still show a decline of about 5 percent in the incidence of water-related diseases (see Figure 3.1).

When the project panchayats in Puthencruz are compared with their district, the district data do not show a declining trend, while the project area data do.

In Sri Lanka, 37 percent of 400 rural households interviewed reported improvement in family health after new water schemes began functioning. In Karnataka, more than half of the households surveyed (54 percent) reported improvement in family health after using the new water schemes. Whether or not beneficiaries rely solely on the new system for their drinking water greatly influences the degree of impacts on health. In Karnataka, those who rely entirely on the system are mainly the beneficiaries using house connections or standpipes. Reasons for using other, less-safe sources range from lack of information or training to distance and social and economic incentives or disincentives.

In China, public health records are kept by a variety of different agencies and gaining access to them systematically proved to be too challenging for the OED audit mission. However, public officials reported that the incidence of hepatitis and typhoid, the two water-related diseases of greatest concern in the area covered by the Bank's project, declined by more than 40 percent after the project facilities came on stream. The study does not attribute all of this decline to the new water supplies, as it is most likely that intensified health education also has been a contributing factor.

The health improvements in many of the countries studied can be contrasted with reports from health posts and partner organizations in Mali. In that country, not only did beneficiaries continue to rely on traditional sources during the months when surface water was available but they also contaminated safe water by carrying it in unclean vessels and by allowing domestic animals to come into contact with it while it was stored in the homes. As a result, health conditions in the project-served areas remained largely unchanged, mirroring conditions in areas not yet served. Nevertheless, in Mali the health benefit of project-built infrastructure is more stark: the boreholes and handpumps assure villages of a year-round source of water supply in a region that has been buffeted by cyclical drought. In a future drought, the existence of boreholes reaching aquifers that were

previously untapped (and the installation of piston handpumps capable of raising that water to the surface) will help to ensure the survival of the beneficiary community. The suboptimal health results in Mali highlight the lesson long-stressed by OED that hygiene and health training need to accompany the construction of water and sanitation infrastructure in rural areas if health improvements are to be obtained.

Social Impacts

The aftereffects of RWS lending often include an increase in local organizational capacity: the new village-level institutions that have been created in many villages to operate and maintain the water schemes make those communities more self-reliant. Not all projects studied created water committees. Some strengthened already-existing institutions, and a few villages just received quality of life improvements thanks to their local government or water authority providing new or improved services. Beyond the new organizations, their installations, and the changed interaction patterns they caused, the true extent of local involvement can be seen in the membership of the new organizations, attendance at water committee meetings, and participation in the design and maintenance of the projects. Participation varies across projects (with most notable differences between Kerala and Paraguay) but the capacity and legitimacy of village social and political structures are everywhere central to project success or failure.

In Paraguay, rural water supply and sanitation loans (four so far) have followed the same community-based strategic approach, requiring that each participating village operate and maintain a water system. Successive loans have extended coverage to new communities and geographic regions. The creation and continuing existence of the juntas—legally recognized entities owned by the village, entitled to own property, contract debts, and operate services—are a major social impact in themselves. The creation of new juntas is politically popular, with both the local people and the national politicians who enjoy the ribbon-cutting opportunities. Naturally, developing the juntas has required an intensive, long-term commitment to training and follow-up that has been costly. Per capita costs for water supply are higher in the Paraguay projects than elsewhere.[12]

Attendance at water committee or user group meetings can be used to gauge the community commitment to and involvement in the new projects. In Karnataka, 83 percent of respondents thought that water committees benefited from "good attendance," while only 55 percent of respondents in Maharashtra could say the same.[13] In Mali, the study found that in most villages the water committee had not met in years—in only one out of 15 (purposively) sampled villages did the committee meet regularly and raise funds for parts and service. In Sri Lanka, the project enjoyed both a high rate of participation in the design and selection of the projects and increased social interaction after the projects were in place (through new projects such as road construction and the use of the water committees' reserve funds for maintenance to extend revolving credit to members).

Just as not every water committee enjoys high levels of support from the community and attendance at meetings, so every community with a water scheme does not actually have a committee, project rules notwithstanding. In Karnataka, in 22 out of 30 villages surveyed, the water scheme has been fully and officially handed over to the water committee by the govern-

ment; yet in 2 of those villages no committee was functioning when the study team was in the field. In Sri Lanka, all 18 communities surveyed have a local water users' group.

The formation of water committees provides opportunities for community growth through employment, increased interaction, and opportunities for women. In Paraguay, Sri Lanka, and the Indian projects, water committees provide women a forum for involvement in decisionmaking. The level of participation varied across countries, but in Paraguay especially, women became water committee presidents, vice-presidents, secretaries, and treasurers. In fact, the number of paid jobs held by women stayed constantly at the level of 13-15 percent. In Sri Lanka, about 50 percent of the committee members were women, and women in 30 percent of the households using the new schemes participated in the design and selection process. Karnataka exhibited the lowest level of involvement by women on water committees (14 percent), even lower than that of Maharashtra (20 percent). In both projects, the study survey revealed that only 3 percent of respondents were satisfied with the current level of participation by women, whereas in Maharashtra 14 percent of respondents were satisfied.

Poverty Impacts

In general, poor rural households in all the projects studied significantly improved their living standards through involvement in RWS projects. Impacts were felt in reductions of time spent collecting water, reductions in family income spent to buy water, and better health that led to greater labor productivity and medical expenditures avoided. In every project studied, easier access to safe water also led to new income-generating activities and, in some cases, increased personal wealth because household proximity to the water source permitted the development of small enterprises. Activities ranged from restaurants and laundries to agriculture and animal husbandry to the sale of alcoholic and nonalcoholic drinks. The direct economic impact of water access was slight, however; in the most active communities, no more than a handful of people made a significant career or income change, and in many communities no one did. In Sri Lanka, 8 of 380 households interviewed reported involvement with such activities, while 1.7 percent of the households in Karnataka and 0.9 percent of the households in Maharashtra reported the same.

Indirect economic impacts were considerable; reductions in time spent per household in water collection freed up labor for other income-producing activities and schooling. Such gains were highest for Sri Lanka and Karnataka. Households in Sri Lanka reported saving up to 30 hours a month. Considering that the agricultural work day is about 10 hours long, this savings represents 3 working days per month that could be used to increase individual earning capacity or in other productive activities. Karnataka had even more substantial time savings, with a household in a typical village reporting the equivalent of 9 additional 10-hour working days per month. If paid labor could be found for this individual worker's time it would correspond to a large potential increase in household income. Time savings were much less significant for Paraguay and Kerala, where most families already had close access to water, albeit of uncertain quality and poor reliability. Of course, many of the families unable to obtain paid work during this available period of hours simply produced additional agricultural commodities.

Rural villages in Mali have to rely on the contaminated water available from traditional sources (shallow wells, swamps, and creeks) unless they have access to a drilled well, handpump, and improved well site. Carrying water is traditionally women's work, as is household cleanliness and sanitation-related maintenance, and during the driest months they used to carry water from sources several kilometers away from the villages. Project documents note that before the project women devoted an estimated 20 percent of their time to collecting household water. The project's target group was highly dispersed in small villages—about 80 percent of the country's approximately 9,500 villages have fewer than 600 residents. After the project, all of the villages had one or more handpumps, so that villages in the most isolated and water-poor areas reduced the time spent gathering water the most.

Field observations and stakeholder interviews revealed that a safe and more convenient water supply has certainly improved the quality of life and productivity of rural women who use project-supplied water in their homes. Easier access to safe water (and an assured supply) allows women to provide a cleaner home environment with less effort. It is now easier and safer to wash their children. They wash their own and their children's hands more often, and healthier children allow the mothers to be away from the house doing productive activities more days per year. Safe water close to the home helps women to keep food preparation areas clean. Clothes washing and cooking are simplified and less time consuming. Children's education is also greatly enhanced by good health (and nutrition is improved by adequate hygiene). All this can also lead to higher self-esteem and a greater sense of self-worth.

In Kerala, women are also in charge of household cleanliness and providing water for home use. Access to improved sanitation has effects beyond reducing the health impacts of open defecation. In some villages, women could attend to their bodily functions only during hours of darkness as it is not proper for them to be seen doing so by light of day. Having a clean place to attend to personal hygiene is particularly welcome during menstruation.

Increases in nonwater expenditures from decreases in expenditures on safe water were found to be significant in Paraguay. About half of the families affected by the project used to purchase water from vendors, thereby consuming 12 percent of their poverty-threshold income. Now they spend only 4 percent of their income on larger volumes of safe water—an 8 percent savings in annual family income. Vendors unable to find new clients saw their income decline as a result.

A final important poverty impact was the consequence of better health, which enables the poor to engage more readily in labor and other tasks. Paraguayan villagers reported higher labor productivity with the increased access to safe water. In Sri Lanka, the highest percentage improvements in health were for families that still share access to water points, indicating that health impacts were greatest for the poorest in these projects. The average cost of medical intervention and medicines for water-related stomach distress was calculated to be $13 per visit in Paraguay, not counting forgone benefits of work and income lost. Forgone medicine costs and doctors visits also benefit the lowest income groups the most.

Training Impacts

Training in health and hygiene in most cases took place after communities obtained access to safe water (Mali, Karnataka, and Kerala), while in one case (Paraguay) educational campaigns occurred while the systems were still under construction. Such training generally involved promoting the use of safe water to maximize health benefits, increasing awareness of disease vectors, and hygiene training. Participation rates of beneficiary families in these training activities vary across countries: in Sri Lanka, 43.1 percent of households surveyed remembered receiving hygiene training; in Karnataka, only 7.9 percent remembered receiving training. Yet in Maharashtra, 41.8 percent of households reported having received hygiene training. While there is information about the number and location of local courses given in Paraguay and attendance figures (952 events with 160,000 attendees), there are no data on whether villagers remember having taken the courses.

While such data cannot approximate the impacts of training, other data hint at the relationship between training and village health and hygiene. In Mali, health workers estimated that the health impacts have been nearly nil as villagers continue to make use of traditional sources and contaminated vessels for drinking water during rainy months. In Karnataka, 41 percent of households surveyed report purifying their water when necessary before drinking it. As for environmental hygiene, in Mali hygiene training had focused on the need to keep the area around the pump clean. The study found that only 1 out of 22 water points visited was cleaned daily as recommended, and 2 water points showed a cavalier disregard for hygiene that was cause for immediate and serious concern. In Sri Lanka, of the 43 percent of households that had reported receiving hygiene training, 89 percent categorized water from local rivers or streams as unsafe for drinking without additional treatment. The study found nearly identical results for the households that received hygiene training in Karnataka.

Water committees in Kerala, Mali, Paraguay, and Sri Lanka received training in technical matters. In Paraguay, courses covered water quality testing, water treatment plant operation, and the handling of chlorine. In Mali, Paraguay, and Sri Lanka, training transferred skills for safe and sustainable operation but not necessarily major repairs.

The impacts of the technical training can be estimated preliminarily in the reported water quality from the new sources. In Karnataka, for example, where more than half the users reported that major system leakage was routine, 13 percent of users complained of excessive or unpleasant coloration of their water, and about 26 percent complained of excessive turbidity. In that project, testing water quality was a regular activity at the outset of the project but became sporadic or was discontinued in some villages. These user observations suggest that training had minimal impact on communities' technical capacity to maintain a safe and sustainable water system. In Maharashtra, water quality is tested regularly in only 40 percent of villages.

While data on the impacts of administrative training are lacking, much is known about the achievements. Courses in Kerala covered project management through network analysis, computer awareness and software applications, and accounting. The participants were usually utility employees. In interviews with project staff, the areas most cited as having improved because of participation in the Bank-financed activities are finance and accounting: Kerala Water Authority (KWA) is now using a commercial system of accounts and

computerized accounting and information management systems. In Paraguay, training covered basic accounting and assistance in the formulation of tariff structures. OED data from Sri Lanka and India provide participation rates in administrative training offered: more than 80 percent of water groups in Sri Lanka and about 40 percent of water groups in Karnataka took part in such training. In contrast, only 5 percent of water groups in Maharashtra took part in administrative training.

Property Values and Densification Impacts

In some cases, plots of land served by project water schemes appreciate substantially in value or create incentives for increased densification. In Kerala, where the study was able to review property records and compare the before-and-after project growth patterns, two wards experienced a 1–2 percent annual increase in the number of households compared with before the project. This increase translated into an outpacing of rural population growth by the number of houses being built. The introduction of a new water system in two Kerala villages (Alkkaranad and Vadavukode) also explains a fivefold increase in the value of land. In percentage terms, local panchayat executive council members estimated that the average increase in the cost of one house plot served by the new water source from 1989 to 1997 was 186 percent for Alkkaranad and 225 percent for Vadavukode. In Paraguay, beneficiaries also reported that after the introduction of the water system, the number of houses in many villages increased dramatically.

Investments in piped rural water schemes often lead to increased densification and higher land and housing prices, especially if the intervention is highly localized. This means that estimates of population growth rates may be necessary but not sufficient to establish future usage patterns and trends when engineers design rural water systems. When users determine institutional rules for service provision and expansion, distortions in the local property market are ameliorated to some degree.

Chapter 4

Strengths and Weaknesses of Three Approaches to Rural Water Supply

This chapter traces the evolution of the Bank's approach to RWS and suggests lessons based on OED evaluations of mostly completed projects that may be of use given the current status of this institutional and social evolution. A large cohort of Bank-funded projects relied on public utilities to provide improved service—the services provided were often costly and delivery was inefficient, leading to large annual public subsidies and beneficiary dissatisfaction. Another group of projects relied on village-level committees, but they failed to provide ongoing institutional support, and local groups weakened and ceased functioning. More recent projects have provided more significant and enduring institutional support, but in many cases this assistance was discontinued before the local groups had capacity adequate to handle the full gamut of challenges involved in the technical and financial management of a water system. Earlier community-based projects tended to focus on the technological obstacles that confronted them, but once these were overcome, a plethora of institutional and social issues emerged. Later projects were more cognizant of the institutional challenge, but they still underestimated the challenge, devoting too few human and financial resources to developing viable local institutions. Current projects may well be doing all that is truly required, but experience indicates that ongoing monitoring and having a local intervenor capable of stepping in to provide support when local capacities are not up to the challenge are prerequisites of success.

The Top-Down Approach

A traditional "top-down" approach has often been followed in the past, whereby government agencies decided which communities should receive what water services. Government agencies or projects tended to be paternalistic.

Aspects of the Top-Down Approach

- Supply-driven
- Centralized beneficiary selection
- Top-down decisionmaking
- Maintenance a governmental (utility) responsibility
- Government-controlled spare parts distribution
- Government selection of technicians
- Weak local water committees, if any
- Water given out free or at very low cost

One of the projects studied in India exemplifies this type of approach. The Kerala Water Supply and Sanitation Project (Credit 1622-IN) was implemented between 1985 and 1994. About 75 percent of credit proceeds went to RWS components for communities that had no piped water, as well as to those that had unsafe or distant sources of supply. During project preparation, circumstances in Kerala appeared to be particularly appropriate for a statewide WSS project when the state government created a new agency, the semi-autonomous Kerala Water Authority. KWA was given clear responsibility for production, distribution, and retail sale of water services.

The broad aim of the project was to strengthen the institutional, operational, and financial performance of KWA so that, in top-down fashion, it could proceed to tackle the physical needs of rural villagers. The objectives of the project included providing piped water supplies to about one million people living in seven rural areas and introducing low-cost on-site sanitation facilities. A tax of 4 percent of the annual estimated rental value of buildings was established to cover the cost of water supply and other local services. Some of the funds generated by this tax were used to pay for the water used at public standposts—essentially taps and faucets located in public areas where people could fill containers and carry water home. In many rural villages, local government collected the tax, although the money that should have been used to pay for water did not make it to the KWA with any regularity because local government expenditures usually exceeded tax revenues. Villagers who had household connections paid a set tariff independent of the amount consumed.

KWA staff decided which rural areas would benefit from new water systems. These decisions were based on complicated criteria. About 80 percent of the investment went to villages that lacked a reliable supply within a depth of 15 meters or a distance of 1.5 kilometers or in which the supply either has a high incidence of water-related disease or contains excessive fluorides, iron, or chlorides. No supporting local organization was created during the project, and the rural water users were never brought together for any purpose (maintenance, input in design, labor, or financial contribution) during the implementation of the project. If there was a break in the water lines, villages waited for KWA to discover and fix it.

Even after three years of project extensions, physical works remained incomplete. Institutional development and financial management and accounting aspects also showed little progress. Sources of delays included inadequate organization and management, high staff turnover, lack of counterpart finance, land acquisition difficulties, and poor procurement administration practices. Four years after credit closing, the study team found a much improved situation because many of the things that were supposed to happen during the project cycle took place later. During the period after credit closing, KWA made a series of administrative improvements that should ensure continuing institutional development and better service to its customers. KWA moved toward financial self-reliance following two tariff increases, but it would need to raise tariffs 60 percent more to breakeven. It also began enforcing key regulations and aggressively collecting accounts receivable. Staff training is now a major activity, financial management is much improved, staff openings in critical areas have been filled, and health status in the rural areas has significantly improved.

Sustainability depends on full cost recovery. At present, KWA borrows to pay normal operating expenditures, although part of its operating loss is covered by a subsidy from the state government.

Community-Based Approaches

Rather than increase the capacity of countries to deliver water supply services, the United Nations Children's Fund (UNICEF) and the Bank-executed projects of the UNDP-World Bank Water and Sanitation Program began to help governments facilitate service and promote policy reform, generally by holding important conferences and providing initial investment assistance

Community-Based Approach

- Significant local participation
- Maintenance a local (community) responsibility
- Private sector spare parts distribution
- Community selection of repairmen
- Strong local water committees
- Full cost recovery of O&M and replacement costs

and continued back-up support. In many countries, officials wanted to keep expensive drilling equipment under their control, and they were often hesitant to cede any decisionmaking power to the communities. In the example below, the government was intended to be just a supplier of water points, but it proved hard for officials to meaningfully devolve control over project activities to villagers.

By the time the Mali Rural Water Supply Project (Credit 1431-MLI) was identified and appraised (1980-82) it was clear that reducing the cost (and increasing the efficiency) of O&M was going to require increased beneficiary participation to cover repair costs. The amount and nature of the preparation work that might be required with the beneficiary communities was far less clear. The project was designed to encourage self-reliance by the villagers and to reduce the financial burden on the central government (in terms of the O&M of their handpumps) by holding the villages responsible for part of the cost of the hand pumps and all of their ongoing care. Project staff required that the villages establish a water committee, participate in training, and contribute cash toward pump costs. Drilling the well was subsidized. The implementing agency, Direcion National de l'Hydraulique et de Energie (DNHE), limited its community organization efforts to selling the program to the villagers—that is, establishing the water committee, getting the water committee members to raise the counterpart funds, and having them sign the maintenance agreement. In effect, the villages were visited only until they did what the project documents said they ought to do; little thought was given to how capable the local organization would be of managing the tasks required of it over the longer term.

As has been noted in the previous chapter, study visits to project villages revealed that most had neglected to keep the water committees functioning once the infrastructure was installed. Someone in each village usually still has a copy of the contract they signed with DNHE when the village turned over its cash contribution, a copy of the spare parts price list, and a list of repair costs. But in most villages, no meetings are held, and no maintenance is performed. Although the village organized and raised funds initially following a drought, the level of demand for service (which was a function of shortage and desire for convenience) has diminished considerably after steady rains resumed. More worrying, the pumps were near the end of their seven- to ten-year useful life, and many communities were finding it difficult to cover the cost of a pump overhaul, putting project sustainability at risk. Field visits confirmed the observations of local health workers that the villagers were not routinely or exclusively drinking the potable water they now have access to, thus risking the assumed health benefits.

On the positive side, study visits found that more than 90 percent of the pumps were operational, and the villagers have generally managed to cover the ongoing costs of maintenance. But this success was due to the result of follow-up provided by DNHE (assisted by consultants paid under another Bank loan, which has extended intermediate term back-up support) than any effort by the local water committees. Creating systems and committees adequate to meet the needs of maintaining the cleanliness of the water point and maintaining the pumps required a longer-term field presence and an ongoing follow-up commitment.

The exceptional villages illustrate quite well what the committees were intended to do. In one village visited by the study team, where the pump is highly valued because it is the only one for the whole village and traditional sources are unreliable and dry up quickly, the committee meets regularly to raise funds and is currently holding money in excess of what would normally be required for spare parts and repair costs, given normal wear and tear. In the event of almost any problem, this village will see that its pump is repaired in a matter of hours. In the other villages, there is no money set aside, and each breakdown leads to an informal process of fund raising that may include the chief, a levy on each family, a fund-raising effort by the Young People's Committee, or the *Association des Femmes*. Unorganized villages find raising money for even a small repair to be difficult, they rarely repair a pump in the rainy season, and they often do not begin to organize fund-raising until the water situation approaches crisis in the dry season. Clearly, participation needs to be more than window-dressing if it is to have a positive impact on project sustainability, and the problem of where to buy new pumps and spares is still unresolved.

Around 1988 a more participatory orientation started to be applied in some countries. This has come to be known as the community-based approach. Community water supply and sanitation (CWSS) projects normally include (a) some community involvement in the management of rural water supplies; (b) government promotion rather than provision of services; (c) communities paying part of the capital cost and all normal O&M and repair costs; (d) private sector provision of goods and services; (e) maximization of health benefits by integrating water, sanitation, and hygiene education interventions; and sometimes (f) a special focus on women as users, planners, operators, and managers of water schemes.[14]

The design of the Karnataka project—prepared in the early 1990s—attempted to involve the beneficiaries of the new supply facilities in their O&M and upkeep. Project design activities included testing the effectiveness of proposed community participation by implementing 12 pilot schemes (one in each district), allowing private (house) connections to families that wanted them, and demanding that the local government (mandal), together with water committees, establish tariffs that would completely cover the O&M costs.

Delegating the cost and responsibility for upkeep had become central to the government of India's RWS policy under the Five-Year Development Plans. This was necessary so that additional unmet demand for water could be accommodated and because expanded coverage was making it difficult to meet the cost of providing subsidized service. The Karnataka project included clearly defined attributions for local water committees and basic rules that governed the manner in which the communities are expected to discharge their duties. Specifically, the local government bodies are required to cause beneficiary villages to form village water and sanitation committees to conduct the scheme O&M and handle the business aspects of operating the system—that is, collecting water tariffs at a level that will permit the village to cover the respective costs. But here again, the capital costs are to be met by the Government of India and the state government, which covers them with grants. Water supply facilities are financed through grant funds from state and central government sources with no contribution anticipated from consumers; and environmental sanitation facilities are funded jointly by communities and Karnataka for drainage works at 30 percent and 70 percent, respectively. The state government subsidizes household latrine construction at different rates for low-income and higher-income groups, and the remainder of the costs is covered by beneficiary contributions.

After completion of the schemes, the project transfers them to beneficiary communities for O&M. The beneficiary communities are expected to fully cover the costs of operating the system, including bulk water charges (for villages that get their water from a regional scheme) as well as routine maintenance. The local government unit sets tariffs for the various categories of households, charging one rate for families with house connections and another (lower) rate for those using standposts or handpumps. These tariffs typically include a connection fee and a charge for water consumption set at a level sufficient to fully cover the costs of O&M. In addition,

- The costs of O&M for environmental sanitation facilities were to be covered by the communities (for drainage works) through a maintenance charge.
- Households had to pay off the loans they took out for private latrines.
- The state government issues contracts with local NGOs to pay them for organizing village-level water committees, assisting authorities with village planning, monitoring the villages' initial performance, and promoting sanitation and health education.

The study visited villages when the project was about 80 percent through its implementation cycle. Karnataka communities were mobilized with the help of NGOs, but the creation of opportunities for community members to participate began only well into implementation. With hindsight, it is clear that faster progress and more development impact could have been achieved had participatory activities commenced before and not during system construction. The government is still strongly in charge of implementation, and (perhaps) some officials do not fully understand and appreciate a community-based way of working with villagers. In Karnataka, the cost recovery indicators are still low, critical financial data are generally not available, political interference by local government is a frequent complaint, and sustainability is far from ensured.

The Demand-Responsive Approach

The Bank is currently promoting a demand-responsive approach to the provision of rural water services that focuses on what users want, what they are willing to pay, and what they are able to sustain. Community members are expected to participate in the design process, in particular, to choose collectively the type and the level of service they are willing to pay. In addition, communities are required to contribute cash or labor to construction (linking their contribution to the level of service selected) and to take care of service O&M.

Although many Bank projects claim that they follow DRA in project documents, the term is somewhat overused and vague. A recent article distributed at the landmark Community Water Supply and Sanitation Conference noted that "demand" is a relative term and that while all projects (or programs or activities) are demand-driven, the degree to which they are truly demand-driven depends on who makes the decisions about the type and level of service and what

The Demand-Responsive Approach

- Demand-driven
- Community initiates, plans, implements, maintains, and owns
- Women play a key role
- Private sector provision of goods and services
- Water treated as an economic good
- Strong local water committees
- Full cost recovery of O&M and replacement costs

range of decisions the users make.[15] A project is likely to be more demand-oriented if the decision to participate is made locally and if decisions about which type and level of service to build, over what period, are based on user preferences. Also, negotiated arrangements for cost sharing based on transparent rules tend to be more demand-oriented. The larger the proportion of costs the users pay, the more likely a project is to be demand-oriented (although there is no magic ratio for cost sharing).

The Community Water Supply and Sanitation project (credit 2442-CE) constructed water and sanitary infrastructure in three southern districts of Sri Lanka, where the lack of services had become more severe than elsewhere because of unemployment and lack of investment.[16] As its name implies, the project is characterized by the active participation of beneficiaries in system administration and direct local responsibility for all or certain aspects of O&M. The project promoted self-help, self-reliance, and the sustainable use of water. The project's strategy was to increase beneficiary involvement (including that of women) through existing local groups and, where there were no functional groups, to promote new local water committees to take charge of the development, implementation, and O&M of the project-financed water supply facilities. Sanitation facilities consisted of improved latrines, but these were maintained by each family.

Under the project, communities usually base their choice of technology on the local hydrological and hydrogeological situation and analysis of the cost effectiveness of several scheme designs. The local water users' group then selects the specific scheme design. About 58 percent of villagers in the areas studied were currently receiving safe water from project-built systems. This supply of water comes from protected wells (about 25 percent), spring-source gravity schemes (about 20 percent), and pumped supplies (about 13 percent).

The project provides funds to improve sanitation facilities through grants to eligible local water groups based on proposals from NGOs and the local groups. A hygiene education program provides information on health and sanitation-related issues—specialized training in hygiene was provided for Ministry of Health (MOH) staff, school teachers, NGOs, local water groups and NGO members, community leaders, and volunteer workers in all project communities.

The study examined a representative sample of villages in 1998.[17] All communities studied were found to have a water committee that manages the new schemes, consisting of one representative from each of the households using the scheme. Each of these groups has an executive committee, a governing body that coordinates and implements all scheme-related activities. Members of the executive committees are chosen by election, each member having one vote. Each village's executive committee is responsible for crafting rules that ensure the participation of users in design and construction and, thereafter, rules to govern the daily use and O&M of the local schemes by households. The project rules require that water committees set and collect charges to cover the O&M of new schemes plus a minimum contribution of 20 percent (cash and in-kind) toward capital costs.

The responsibilities for supervising the communities' work with RWS rests with a number of agencies, and the multiplicity of institutions led to overlapping responsibilities, contradictory policies, multiple and conflicting technological standards, coverage gaps, and management deficiencies. Cost recovery had rarely been handled adequately, and while official policy had been (and continues to be) that O&M costs should be fully covered by consumers, it has not

been enforced and subsidies continue. Scheme-specific tariffs appear to be a more sustainable and effective way to operate, as evidenced by the experience of some community-managed schemes. Although NGOs have been active in the rural water subsector, they have functioned primarily as catalysts for community participation and promoters of self-built shallow wells and latrines.

The project rules emphasize providing appropriate options (in terms of cost and affordability) to the community and letting the beneficiaries choose between higher levels of service such as piped schemes with house connections and standposts and simpler facilities such as handpump wells. The key rules are as follows.[18]

- For each scheme, the local water committees cause consumers to collectively contribute at least 20 percent of the direct capital costs, persuade consumers to assume responsibility for O&M on completion of the scheme, and levy tariffs to cover routine O&M costs and debt service.[19]
- For sanitation, the local water users' groups were to ensure that consumers pay 100 percent of the cost to build or upgrade latrines—they are given the opportunity to borrow 50 percent of their cost from the group's revolving fund.
- In addition, district councils and National Water Supply and Drainage Board (NWSDB) set tariffs for the piped schemes operated by them, adequate to cover the full O&M costs and the larger of depreciation or debt service.

The capital contribution described above (consisting of cash and in-kind payments) was at times reduced on a sliding scale because of in-kind contributions. Nevertheless, the villages the study surveyed generally contributed more than 20 percent to capital costs.

Before the project, existing schemes—even the improved ones—did not produce water of acceptable quality (color, turbidity) that was safe for human consumption in quantities sufficient to meet demand through the dry season. In terms of consumer satisfaction, 13 percent of survey respondents said that they found the level of service acceptable before the project; 72 percent said that they were satisfied with the level of service they are getting now (from the project-built scheme). In terms of village participation in project design, 17 out of 18 of the surveyed villages participated in at least some aspect of technology choice or system design. In all 18 villages, the executive committee or other responsible body expressed satisfaction with the design as implemented. The consumer survey found that more than 70 percent of consumers said that the reliability of water service improved year-round because of the project (an additional 10 percent said that reliability had improved only in the wet season—service interruptions were still commonplace during dry months). The preparation of a follow-up project that would apply the community-based approach to a large number of new districts is under way.

Chapter 5

Key Aspects of Community Involvement

In rural water, institutional development is the key to sustainability. What, if any, are the advantages of committees? The Kerala project was not community managed, but it managed to improve service. The RWS project in China (Loan 1578-CHA) served 5,730 communities without water committees.[20] The Liushy reservoir in China's Zhejiang province provides service to more than 400,000 rural people in just one scheme. One advantage of bypassing local organizations is that when implementers can take a top-down approach to determining water service levels, this decision leads to simplified (and therefore rapid) project preparation. But experience shows that the services provided are not always at the scale and cost that beneficiaries wanted. Moreover, while utilities can provide good service, their costs are so high that it is politically difficult to bring tariffs up to financially sustainable levels while continuing to serve the bulk of the target rural population. Working with committees, as in Karnataka, is potentially more cost effective than working with utilities.[21] When local governments handle the administration and O&M of the schemes within their jurisdiction, as happened under the Karnataka and Maharashtra projects, they also tend not to cover their operating costs and wind up delivering an expensive subsidy to a subset of the target group. More worrying to many, little local institutional development took place before or during system construction because all three projects were implemented by state government agencies that tended to be quite paternalistic (although this was markedly less true in Karnataka).

Many of the earlier rural water projects were characterized by a steadily decreasing capacity to provide effective service. Management of water supplies often proved to be beyond the ability of rural communities, particularly (as happened in Mali) when they were expecting ongoing assistance from government or donor agencies and then did not receive it. Soon after the construction of water points, the local groups became nonfunctioning, often even before the contractors had completed the drilling process and installation of the handpumps in the entire project area.

Any attempt to delineate historical periods in the Bank's RWS lending is hampered by exceptions. The most notable of these is Paraguay. This, the first freestanding RWS project, used many elements of the approach that the Bank currently favors and avoided the problem of moribund committees. Later projects moved away from this way of working, perhaps because progress took too long and per capita costs seemed too high. Now the Bank has returned to a community-centered approach, in part because faster ways of working fail to attain sustainable results. The study shows unequivocally that there are no shortcuts—time and effort must be spent supporting the local group until it can perform all of its functions without further assistance. This is not just a rural phenomenon. A recent OED

evaluation of the Brazil Low Income Urban Areas project (Loan 2983-BRA) found that the urban poor require the same thing.

Many practitioners in the Bank see the intractable deficit in RWS worldwide as reason enough to keep interventions low in cost and rapid. At the current rate of progress in Paraguay (in other respects a star performer) it will take decades to reach full rural coverage. In contrast, interventions such as Mali created infrastructure and produced local committees, but most committees have ceased to function, the long-term sustainability of the infrastructure is at risk, and villagers never learned the importance of drinking safe water. Speedy, low-cost implementation means nothing if the stream of benefits is lost.

Does Having a Village-Level Organization Help?

Do the varying levels of rural community participation in the delivery of water service work equally well? If not, can a pattern be discerned that indicates which is the correct modality for a particular set of local conditions? The study found that local water users were served by structures that varied greatly in the degree of local involvement. The projects reviewed cover a broad range of participatory strategies (including no participation at all). At one extreme, project implementers took a top-down approach; at the other extreme, borrower governments, assisted by the Bank, acted as service facilitators rather than service providers.

Local organizations were sometimes loose and informal groupings; often they were committees (with varying legal powers and status), but sometimes existing formal structures in the village (or broader) governments took on the additional task of functioning as the local unit. Between these two extremes there are, of course, intermediate points. The study found instances in which Bank-financed projects paid NGOs to help communities to manage their water system. It found examples of existing local government's sharing their responsibilities as managers of water systems with users. And, as practitioners know only too well, it found instances in which local committees were created on paper but never became a reality in the villages. Committees created by implementing agencies were not sustained when villagers had no real decisionmaking authority.

Creating sustainable new local organizations is time-consuming and can be costly. The only short cut is to take advantage of existing local groups. While this has advantages, care needs to be taken not to overburden an organization that is already straining to handle other matters. What seemed important to the study team was to adapt the project to successful local patterns of practice in other activities rather than to impose a one-model-fits-all type of structure. Balancing staff time and budgetary allocations for system construction and design, hygiene education, and committee development is still more of an art than a science: a consensus has yet to develop among practitioners, and the study provides no cookbook. Still, some general principles have become apparent.

Creating a committee that is adequate to meet the needs of maintaining the cleanliness of the water point, maintaining the piped or pumped system, administering the system in a financially responsible manner, and handling routine O&M required a longer-term presence than was generally provided for under most projects.

Although the study found that the details of water point management varied, that project designs were diverse, and that government and NGO extension services and support were

irregular, village management of water supplies and systems can be well within the ability of local committees, given supportive circumstances. Factors that seem to favor community management across organizational types include

- *Timely educational and training inputs*. The technical preparation of local organizations and the diffusion of potable water-related health benefits were facilitated by timely and coordinated use of training. Training needs to support local capacity, which tends to increase slowly (not limited to the pre-operation phase as in Mali). Projects in all studied countries are showing that health benefits are enhanced by integrating water, sanitation, and hygiene education interventions.
- *Building on the country's social and cultural traditions*. The Paraguay projects built on a long-standing local tradition of working together for the good of the community. In Sri Lanka, where there is a cultural tradition of community service by the elderly, village elders were named as caretakers and put in charge of system maintenance. In Mali, where reliance on village chiefs and elders is more the norm, creating a parallel structure in conflict with traditional leaders made the challenge greater. Chinese villages have their own participation patterns that they used to accommodate the project to the village and vice versa.
- *Continuity of staffing*. Limiting changes to key Bank and government staff maximizes efficiency and progress toward agreed-upon goals. Rural water supply loans are more dependent than many Bank projects on a series of complex events taking place in hundreds of villages in more or less the same way. Constancy of vision can facilitate such an undertaking. Support for community organizations should be planned to cover the full implementation period and follow-up after the credit closing should be arranged when necessary. Getting the water committees to a point where they can handle the full range of their responsibilities over the longer term was generally not prized highly enough. Too often, once the systems are in place villagers were left either on their own or at the mercy of those who would exploit them once key staff were transferred elsewhere.
- *Giving more attention to training in administration for projects that depend upon community management*. When the Bank and borrower governments tried to act as service facilitators rather than service providers, they took an overly hands-off approach. The result was not always a local organization sufficiently viable to stand administratively and financially on its own. Administrative tasks were everywhere a challenge. Particularly when water sector projects will be implemented by newly created agencies, Bank staff should anticipate that, at least at the outset, there will be only a modest management capacity to face the massive challenges presented by rural water committees in the formative stage.
- *Systematic encouragement of intervisitation between villages.* Having members of less well run organizations visit more successful ones in nearby villages proved helpful in most countries studied. Borrowing successful administrative techniques, whether they were card filing systems, printed forms, or computer programs, allowed laggards to leapfrog over developmental hurdles.
- *The use of project champions*. Beneficiaries who really understand project-sponsored innovations, believe in them, and make exemplary use of them are often more effective

at communicating with their peers than project staff from outside the project area. The Finnish Ministry of Foreign Affairs, Department for International Development Coordination (FINNIDA) Western Province (Kenya) project had considerable success with expanding champion organizations to cover multiple villages. In Mali, where almost all the committees were doing nothing, the members of active committees should have been hired to do outreach. Future RWS projects need to make special efforts to identify champions, hire them, and incorporate them in extension and education campaigns. Similarly, local organizations that are functioning well are usually happy to show their facilities and explain their management practices to similar organizations in the area.[22]

- *Providing organizations with computers*. It is something of a tautology to say that organizations with computers tended to do better than those without: retained earnings (after paying operating costs) have to exist before a local organization can buy a computer. Thus, the better-run would be more likely to have information processing equipment in the first place. But computers allow better management decisions, and they allow staff more time for longer-term planning. It may be that it costs less to run a computer over the longer term when staff costs and forgone revenues are taken into account (boxes full of paper and file cards are tedious to handle, and important documents get misplaced). Of course, computers require electricity, but so do the reliable electric pumps that are recommended for sustainable piped service.
- *Associate local ownership of infrastructure with the stronger local organizations*. Ownership of key RWS system infrastructure increased villagers' sense of responsibility. The Paraguayan water committees owe some of their stability and permanency to their ownership of significant and visible property. Usually they own at least two plots of land (one where the office is located—they own the building as well—and at least one other for the well, water tank, etc.). The maintenance of office hours meant that users unhappy with any aspect of the service could go and complain, sure of finding someone to listen to their problems at the end of a long walk.

Is Forming a Committee a Prerequisite of Improved Service in Rural Areas?

As is evident from the China, Kerala, and, to a lesser degree, the Mali experience, forming a committee is not necessary if villagers are to enjoy improved water service. With certain notable exceptions, people who live in the rural areas of developed countries benefit from the private or (less frequently) public provision of safe water without having to participate in water users' groups. Either they provide themselves with a small well and mechanized pump and septic system or they receive public water and sewerage for which they are charged.

Bank involvement in the water sector has historically supported both community-based systems and utility-based systems, with the latter clearly predominating in dollar terms. Utility-based systems, as the name implies, are planned and operated by big water utilities (privately or publicly owned) that serve large populations. As the Bank has moved increasingly to supporting projects where rural villagers are members of a group of some sort, this has helped to lower costs, provide a service more in line with beneficiaries' aspirations, and allow people to participate more in their own development.

The experience from all the completed projects that OED has evaluated shows that the design of a project should focus on what is often called "software" aspects with the same intensity that it gives to the technical details. One of the key aspects is to ensure that the villages where the project expects locals to carry out WSS improvements are fully committed to the project principles and to taking over the O&M of the new and improved facilities. This is what the new DRA requires. Social analysis prior to or during project preparation should examine how villagers finance and operate services that they jointly use. Often the management of irrigation water, critically important to all who practice agriculture, can provide important insights. Other activities that villagers usually manage zealously include education, road maintenance, and community collaborative work patterns during planting and harvesting. However, great care must be taken to base projects on local practices and traditions rather than internationally generalized models that specify how villages ought to behave. In countries where social and organizational capacity is low, getting communities ready to discharge their responsibilities often involves the participation of an NGO as a support organization. One of the first tasks is to help the village draw up rules within which the system is to be planned, designed, implemented, and operated after its completion. The NGO may not be needed in situations where a village has high "social capital"— that is, it has already demonstrated that it has the capability to take on such responsibilities through past handling of other developmental activities. Based on conditions observed in most projects, however, NGO assistance would be worth supporting until the NGO can raise the level of social capital in the participating village through promotion campaigns and various types of training.

What Role Does Social Capital Play?

Social scientists studying developing countries could not help but note that countries with similar endowments of natural, physical, and human capital attain very different levels of economic success. The search for an explanation for this phenomenon led to what we currently refer to as "social capital." Social capital is the internal social and cultural coherence of society, the norms and values that govern interactions among people, and the institutions in which they are embedded. Social capital holds communities and groups together. Unless people are willing to trust one another enough to work together, there can be little economic growth, and progress in many other human endeavors will be elusive. Economists are beginning to explore how the traditional categories of natural capital, physical or produced capital, and human capital can be broadened to include social capital.

One of the challenges for development agencies such as the World Bank is to operationalize the concept of social capital and to ascertain how and how much it affects development outcomes. For this study, OED commissioned a team from the IRIS Center at the University of Maryland's Department of Economics to analyze the responses to questionnaires administered during the study. Their paper has been published separately by OED.[23] This work, summarized briefly below, adds to the growing empirical evidence that social capital contributes significantly to sustainable development. In addition, this paper is a first attempt to measure and econometrically evaluate how the impact of community-based water services financed by the Bank is affected by social capital.

Using quantitative and qualitative data from 1,088 rural households and 50 water committees, the IRIS paper focuses on measuring and econometrically analyzing selected aspects of project design in three Bank–financed rural water projects prepared in the early 1990s and implemented in Sri Lanka and two states of India—Karnataka and Maharashtra. In terms of project outcomes, it measures the explanatory power of practices that rural water practitioners have been promoting in recent years, such as the importance of community participation in service design and decisionmaking. While its conclusions are not surprising, providing mathematical confirmation of what has long been suspected represents an important achievement.

While all three projects had "community-based" characteristics, there were major differences in their design and implementation. The analysis of the data yielded the following empirical results. First, improved household health is more likely in communities that pay careful attention to the design and construction of water facilities and among households that have enrolled in hygiene classes. Second, rules that promote community participation and decisionmaking about service design lead to better-designed services. Third, adequate mechanisms to monitor household contributions to service construction lead to higher-quality construction and better-functioning services. Additionally, the paper reviewed case study results showing how the performance of governmental and NGO institutions affected the quality of service delivery.

In Karnataka and Sri Lanka, communities were to take responsibility for the O&M of the water service after construction and levy tariffs on households to cover O&M costs. In Maharashtra, by contrast, district and local governments were to take care of the O&M of constructed water facilities. Whether contributions were made or maintenance was performed depended on the way in which the water service was operated by each community—the existence and effectiveness of rules about decisionmaking, monitoring, and sanctions. These service rules determined whether households participated in the design process, contributed the required inputs to construction, and operated and maintained the water service properly.

The results for testing the several equations can be summarized as follows: "Community design satisfaction" is a significant and positive determinant of improved health in all three projects. In other words, improving community satisfaction with the service design enhances the service's health impact at the household level.

"Good quality construction" is a significant and positive determinant of improved health in Sri Lanka and Maharashtra (and positive in Karnataka). A change from bad construction (the presence of serious construction defects) to good-quality construction (the absence of serious construction defects) is associated with an increase in the probability of improved household health.

Enrollment in a hygiene class is associated with an increase in the probability of improved health, and providing hygiene training as part of the project (or ensuring that hygiene training is provided by other sources) enhances the health impact of the project. Households are no more satisfied with service design when the original idea to build a system comes from community leaders than from outsiders. User participation in design leads to greater satisfaction with service design. Hence, involving users in service design is a good way to increase user satisfaction and, thereby, service impact, and when commu-

nity members have the final decision about what type of system to build, households are more satisfied with service design. Construction quality is enhanced by the existence of mechanisms to monitor that households contribute as required to service construction. The presence of construction sanctions, by contrast, has no measurable effect on construction outcomes.

Greater social capital in a community leads to more participation in service design, controlling for other likely household- and community-level determinants. In communities with active community groups, participation in service design is likely to be higher. Greater social capital in a community is positively associated with more construction monitoring. This suggests that communities with greater social interaction are likely to be capable of crafting effective rules to govern the design, construction, and O&M of the water service, including crafting the rules about monitoring household actions.

Overall, these results show the importance of three specific types of rules for service performance. Rules that promote community participation and rules that promote community decisionmaking about service design will lead to well-designed services. Additionally, rules that promote monitoring of household contributions to construction will lead to better-constructed services. The authors concluded that measuring preexisting levels of social capital in communities can be economically justified and may lead to improved approaches to service delivery and monitoring.

The existence of active civic associations and clubs as well as patterns of social interaction among water users improve service performance, since community members are accustomed to working together as a group. Also, social ties among community members deter free-riding and encourage community members to hold to their commitments.

These results have important policy implications. They provide an economic justification, during the design of community-based water projects, for investments in social assessments to analyze the level of the prevailing social capital, in particular of active civic associations. Identifying communities with high levels of social capital within a target region will provide outside stakeholders—including government officials, representatives of NGOs, and Bank staff—with a set of communities in which the investment in water systems, all other things being equal, will have higher expected economic returns.

However, national policy or loan conditions often dictate that investments in water systems be targeted to the poorest communities, many of which are likely to have lower levels of social capital.[24] When targeting these communities, the allocation of investment resources for water services programs needs to be adjusted accordingly. Possible adjustments include increased investments in social mobilization efforts (for example, through the strengthening of local organizations) and in more direct supervision by project personnel of these communities to oversee the system performance.[25]

Community-based WSS services are likely to perform better and have stronger impacts in communities with high levels of social capital. In communities with low levels of social capital, special efforts may be necessary to motivate and mobilize community members. Success in one community activity often leads a village to success in a subsequent activity. The fiscal incentive most governments give to communities tends to restrain the choice of water systems to the minimum level of service so that the limited funding can be stretched to cover as many communities as possible. In addition, such an approach is consistent with

the concept of incremental development. In order to allow social capital to be developed over time, communities can be encouraged to adopt incremental planning and implementation of their system so that management experience can be gained by starting with relatively small initiatives and building on them. This is possible only if villagers can be assured that funding will still be available when it is time to expand the system (as would be the case with Adaptive Program Lending, which allows for longer-term commitments to a sector).

During the design phase, involved project staff, often engineers by training, usually see project risks as being of a technical and hydrogeological nature. By the end of implementation, however, it is usually more than apparent that the long-term challenges posed by RWS projects are educational and organizational in nature. For this reason, staff mix on appraisal deserves more attention than it has received in the past. Rules need to be clear, well-understood, and accepted by all stakeholders. Other recommendations that come from study findings on social capital are

- Develop rules early. The project implementer's role, the communities' role, and the functions of local committees and other groups (and the rules that govern their behavior) need to be specified clearly and designed early in the project cycle to facilitate broad participation in all aspects of project development.
- When social capital levels are low, a long-term commitment is required from the outset. In such cases, to leave behind a socially and administratively functional water committee, consider contracting one or more NGOs. This may be an aspect handled better by NGOs than by the Bank—especially in areas where keeping the technology functioning will need support after the credit closing or making preventive maintenance a part of the local culture is required. Imparting the required instructions on health and hygiene, setting up a sustainable spare parts distribution system, and providing technical support to artisan pump mechanics all require a long time horizon. Future RWS projects will need to make support for training and education more integral and ongoing.
- Involve women in the design and management of the RWS service. The results of the OED studies provide strong evidence that involvement of users in all aspects of water supply system development, implementation, and O&M can improve sustainability. Involving women makes particularly good sense because women are the primary system users. Women's involvement in system management is critical for performance: women are the primary water collectors in most rural households and have the most interest in ensuring that the WSS service matches their needs and performs well.
- Project design should respond to differences between small town and village service-standard aspirations. In the past few years, aspirations have steadily risen, even in very poor countries. Whereas rural villages are often quite dispersed and improved point sources may be in line with local aspirations and willingness-to-pay, small towns lend themselves better to motorized piped systems. Residents of small towns (population of more than 2,000) tend to be more prosperous than villagers, and they often aspire to higher levels of service. People in small rural towns have little incentive to participate actively if the service they are going to be provided with does not meet their aspirations. There is also a financial justification for aiming high, especially if there is a chance that

government subsidies will be lost by waiting. The amounts of money that can be collected from the use of very simple systems that do not provide in-household service (after paying personnel costs) rarely cover even ongoing O&M, much less full cost recovery. Maximizing house connections (and yard taps, based on felt needs and real demand, of course) creates the possibility of collecting enough money through fees and tariffs to attract a private operator. Alternatively, higher service levels make the continuing existence of a local water committee worthwhile. Health improvements are related to water consumption, which is higher with household service. A recent Bank discussion paper that reviewed the linkages between health and access to water in Andhra Pradesh (India) concluded that the health benefits of private household connections far exceeded those offered by shared point sources.[26] The study team recognizes that house connections are going to remain a dream for most rural dwellers in Africa because funding the initial investment is a bottleneck for most governments.

- Design systems for full coverage and equitable distribution by taking into account all the families in a village. Many systems take on additional users quickly and then have difficulty providing adequate water service to all users, especially those living in hard-to-serve areas such as hilltops. An extremely common pattern is that systems are designed for only the original number of users who express interest and pay their quota. Once the rest of the community sees that a system was really built, they begin applying pressure on the executive committee to include more families. Systems usually expand until the quality of service approaches the intolerable. For that reason, it is better to design for full coverage and to levy a significant penalty surcharge for each system expansion caused by late acceptors.

Chapter 6

Facing the Realities of Finance, Maintenance, and Monitoring

While recognizing and applauding the current Bank commitment to financially sustainable RWS, study findings indicate that it is a goal that should be approached incrementally. Practitioners widely agree that villagers who use a rural water system must be responsible for its O&M costs. Among the projects OED evaluated, only in China was full recovery of capital costs attained.[27] But the only exception contrasts starkly with the prevailing pattern: in all the other projects studied, the government subsidized (usually a large) part of those costs. In the sample studied, increased participation of villagers in the operation of the system lowered costs, which permitted reduced levels of subsidy, but it did not eliminate them. The economic justification of an RWS project must include benefits generated by time savings and positive health impacts; the extent of the benefits from actual time-savings described elsewhere in this document is compelling, and the health improvement data are at least suggestive. In general, RWS projects can hardly be economically justified without accounting for these factors. The monetary value of saved time, for instance, is usually a key input in the economic analysis of RWS projects, especially when accounted as lost wages. Therefore, while a financial rate of return determined by direct cost recovery is an important factor, the use of subsidies can be justified by the overall economic rate of return, which would include these time savings and savings in health care costs.

Realism and Cost Recovery

Partly because of overpromising in the past, but also because of legitimate definitional differences, RWS projects face a truth-in-advertising problem with cost recovery. Even in relatively prosperous Paraguay, 10–15 percent of potential users choose to forgo water service because of its cost. Raising water prices in order to improve cost recovery would probably cause more families to drop out and potentially leave revenue levels much the same.

It appears to be preferable to recognize the highest level of cost recovery attained up to now (in the country or comparable neighbors) and state in project documents that there will be subsidies and to commit the project to a gradual program to eliminate them. Documents prepared for the May 1998 Bank-sponsored Community Water and Sanitation Conference warned that if project rules specify a maximum project cost that is eligible for a subsidy (and the community is held responsible for any costs above this maximum), pressure is created to raise the maximum, which often leads to greater subsidies over the longterm. In other Bank projects, cost-sharing arrangements have been stated in terms of a percentage of the costs to be

borne by the users. This confuses users when they have to choose among options without knowing what each option actually costs. It also creates an unknown liability in subsidies for which the government will be responsible. Initially subsidies can be limited to a per capita or per household amount, with the users being responsible for all additional costs. This is also helpful for government planners, because public fiscal responsibility can be accurately estimated. And planning is made more rational if it is clear how many people a given budget allocation will provide RWS service for. Naturally, this also helps the users to know their cost for the various levels of service that are available.

Many community-operated systems are nearing the end of the designed life span of their most expensive components without having set aside reserves. If communities raise tariffs to cover equipment replacement at too late a date, they would be inordinately high, which would likely drive people back to traditional sources. Since this could actually reduce revenues, having waited so long to start saving, only a few communities will be able to find some means of generating replacement costs. Even with the piston handpump systems used in Mali (and elsewhere), the current cost of an improved India Mark II is about $1,200 not counting installation, and larger villages can have 10 or more units. This means that all the gains of two decades of lending in the subsector are at risk. Some countries have developed the "water fund" idea to support communities with this type of problem. In other countries, a policy based on designed lifespans has been used. With such an approach, for example, the state might subsidize the replacement of equipment with a designed lifespan over ten years.

Even though rural water projects have made great strides in getting rural villagers to cover more of their systems' operating costs, nowhere in the world did the study find a majority of beneficiary communities ready to cover the costs of a major overhaul or the complete replacement of their systems' most expensive components (again with the possible exception of China, the only studied country to achieve full cost recovery). In Mali, where relatively inexpensive handpumps were used almost universally, the pumps were nearing the end of their design life. Not one of the villages visited indicated that it could meet the full costs of a complete pump rebuild while simultaneously replacing the tubing. Financing system expansions is also a problem. Even in Paraguay, where the study found the strongest local organizations (both financially and socially), only a few communities would be able to generate the funds necessary to replace the massive steel-reinforced concrete water towers that are essential to their systems—and a few were already older than 20 years old and within a year or two of needing replacement.

Cost recovery in one instance had deleterious effects. In Côte d'Ivoire, the study found villages where cost recovery efforts limited access. In these villages, one person was appointed to supervise the water point and to collect (minimal) contributions from each person who came to draw water. The tariff depended on the size of the vessel used. The money raised was supposed to cover the salary of the responsible person, with the remainder set aside to cover repairs and spare parts. Small children were exempted and could drink and carry very small vessels without charge. Additionally, many youths in town earned small amounts by drawing and selling water. Nevertheless, villagers reported that some families found it difficult to pay the amounts required and consequently refrained from using the water points. Village leaders admitted that collected funds were used for

nonwater purposes, with the result that financing repairs was still sometimes problematic.

The empirical work done for the study found that many unexpected social factors are related to effective cost recovery. Factors such as participation in multiple community activities by user group members, participation in system design, participation in system construction, recognition of improved beneficiary health, and satisfactory participation in the water group by women are all related to above-average cost recovery. Consequently, during project design, special attention needs to be given to these and related areas.

Other Financial Concerns

In addition to cost recovery there are other financial concerns:

- It takes a long time for people to get over the idea that government will provide. Capital grants that keep public service levels affordable compromise utilities' autonomy because they constrain organizations from making politically sensitive tariff increases, which impedes their progress toward financial viability and sustainability. This would not be a problem under DRA.
- When beneficiaries make a regular and significant financial contribution to the operation of a water scheme, they feel a sense of ownership and demand more say in scheme operation. In communities where a substantial portion of O&M costs is covered by users, the users become more concerned about management aspects involved with keeping costs low. This was true in Rajasthan and, to a lesser degree, in Kerala as well. The effectiveness of water committees influences the performance of the water service. They provide users with incentives to contribute the required inputs to the design, construction, and O&M of water services.
- Tariffs need to be set at sustainable levels. The strongest and weakest committees in each project studied are separated by a large gap. The biggest difference between them is income, a function of tariffs and the ability to charge for actual use. While the village committees are in the business of providing an affordable service to their members rather than trying to make a profit for their stockholders, too many committees do not understand the full cost of the service they provide. Ultimately, it is in the interest of their members to replace expensive infrastructure (such as pumps and water towers) before the end of their useful life and not after. Committees that cover the full cost of water supply ultimately provide better service to members, but often getting to that point involves the use of metering, which drives per capita costs up significantly.
- In project design, aim at a high recovery level for O&M costs early in implementation. Although full recovery of O&M costs is possible and desirable—and it is the sine qua non of longer-term sustainability—villagers do not understand how to calculate their full costs, and so fail to recover them because, as noted above, they almost never take into account infrastructure replacement. Because of the poverty in most rural villages, developing financial mechanisms that begin to depreciate the infrastructure from the beginning of its designed life keeps costs affordable. Waiting to raise funds for major replacements until near the end of components, designed life makes it nearly impossible, and puts the committees' institutional development at risk.

Operations and Maintenance

Early projects were plagued by technical problems that have largely been overcome. Most projects now take steps to overcome the shortage of trained repair people, difficulty obtaining spare parts, and funding-related activities on a sustained basis. In the future, motorized pumps and small networks may need to be used more widely. If villagers are going to have to come to terms with the requirements of machines, machines that do a bit more of the work might have been more appropriate in the large villages. When potable water is available out of standpipes (shared faucets) rather than handpumps, the use of water increases and thus health benefits also increase. This is especially true, of course, where surface water or unsafe shallow wells are present. Designers should always consider the mininetwork solution when electricity is available and service at that level meets local aspirations.

In technical terms, the design of the system and facilities needs to be based on the village's real demand for the service, which should be carefully reviewed with regard to the level of service and coverage targets. This approach, of course, needs to take into account that different levels represent different levels of cost recovery requirements as well.

Rural electrification greatly simplifies the task facing village committees. Nearly universal rural electrification permitted the Paraguay projects to use reliable electric pumps. One of the greatest problems RWS projects face in most countries is tied to the maintenance, repair, and parts supply associated with gasoline- and diesel-powered pumps or handpumps. Electrification also permits electronic bookkeeping.

Investments in piped rural water schemes will lead to increased densification and higher land and housing prices, especially if the intervention is highly localized. This means that population growth rates may be necessary but not sufficient to establish future usage patterns and trends during rural water system design.

Committee Participation in Operation and Maintenance

The timing and manner in which responsibility is transferred from the government to the local water committee has ramifications for billing, collection rates, and daily O&M. In Karnataka, Paraguay, and Sri Lanka, governments transferred this responsibility to local authorities and water committees with some success. While data are lacking for many project villages, in Karnataka 73 percent of the villages surveyed have taken over full operational responsibility for the water schemes.[28]

In Karnataka and Sri Lanka, the project trained local water committees and user groups to take full responsibility for O&M, which, with assistance from local NGOs, appears to be working well. In Paraguay, where all the villages have taken over operational responsibility, juntas in each village receive minimal supervision from the National Environmental Sanitation Service (SENASA). They are responsible for all aspects of the village water systems (which vary in size from about 50 to 5,000 connections).[29] Juntas maintain the well site, keep pumps and the piped network in working order, clean and maintain ground level and elevated reservoirs, and do accounting and billing.

Long before local organizations take over the full operation of their schemes, there are clear indications of how ready they are to do so. During the construction phase, under many projects' rules the local group is responsible for monitoring its members' work, their financial contributions to the task at hand, and the construction materials. Study data show that where monitor-

ing of household contributions to O&M was particularly good, it boded well for subsequent system operation. Conversely, where that task was beyond the ability of the local group, system operation also proved to be a challenge. Monitoring of preliminary activities was rated poor by the beneficiaries in Karnataka (32 percent of schemes) and Maharashtra (8.1 percent of schemes) but very good in Sri Lanka (92 percent of households).

The contribution of community beneficiaries to O&M varies across projects. In Sri Lanka, the study found that about 50 percent of households reported contributing labor to routine O&M tasks or participating in extraordinary or less frequent tasks. In villages surveyed in Karnataka, users make in-kind contributions (mostly labor) to system O&M, with an average frequency of one day of labor per year.

In Paraguay and Sri Lanka, after the government provides the initial financing, water committees handle billing. Local groups generally find it easier to collect the rates than to figure out how much to charge. In Paraguay, while the village groups have the authority to raise tariffs with the approval of the government (usually just a formality), most juntas hesitate too long to raise the tariffs. While they understand the necessity of covering ongoing costs quite well, the notion of depreciation is sometimes difficult to grasp.

Collection rates also largely depend on the tenacity of water committees and whether or not billing is the responsibility of the local institutions or water authorities. In Kerala, for example, while the water authority is responsible for statewide billing, in many regions it has been able to target the largest private debtors and those farthest behind in their payments quite successfully. Public hospitals, schools, and other public institutions rarely pay their water bills, however, and the water authority has been unable to convince the state government to intervene. In Karnataka, the full tariffs are not paid. The study found, however, that of the users who are charged, 95 percent pay something for either water or sanitation or both. This figure is deceptive; although this appears to be a high collection rate at first, it implies that many users are not paying what they should, and some are not paying anything at all.

The study found that in only 1 out of 15 sample villages in Mali did the local committee clean the water point and lubricate and adjust its handpumps. In random spot checks, only 1 out of 21 water pumps visited by the study team had ever been greased, although in each village one or two people had received training in simple maintenance at the beginning of the project. In contrast, in Sri Lanka where the project also trained a few villagers in each local water users' group in system maintenance, many groups named one of the village elders to be caretakers. This has worked quite well, although it may not be a practice easily transferable to other countries because it is based on a cultural tradition of community service by the elderly. In India, the study surveys reveal that in Karnataka, only 32 percent of the water committees bothered to monitor O&M; in Maharashtra, only 8 percent were doing so. For these two project areas, the frequency of system failure was moderate: 25 percent of communities in Karnataka reported frequent system failure, while that percentage increased to 57 percent for communities in Maharashtra.

The length of time local groups allowed service interruptions to go on varied across countries: in some projects beneficiaries reported no major interruptions and in others they complained of two-week intervals without water service. In Sri Lanka, where schemes are still relatively new and no major repairs have been needed, users reported no major interruptions in service. In Paraguay, users reported that the longest interruptions in service

lasted two days. Reported interruptions in service were highest in India, where major repairs averaged one week in Karnataka and Maharashtra, and the longest reported service interruptions lasted two weeks.

Access to tools and spare parts plays a large role in facilitating effective local O&M. In Sri Lanka, 44 percent of water groups reported satisfactory access to tools and spare parts. In Karnataka, while 75 percent of water groups claimed that they have an adequate supply of tools, only 33 percent noted satisfactory access to spare parts.

Private Sector Participation in O&M

The study found that private sector service providers could contribute to operating efficiencies, but they did not invariably do so, and that it is better to let private providers and committees find each other than to try to arrange a marriage. Similarly, while local manufacture of equipment and spare parts is a good thing, if identical equipment built elsewhere is of better quality and cheaper, attempts to fight the market are going to prove expensive, and such efforts are unlikely to yield sustainable providers over the longer term. It may be that the Bank has a role in building up the capacity of the local private sector, but none of the evaluations conducted sheds any light on how that should take place.

The ability to purchase needed tools and spare parts from the private sector is critical if local groups are going to manage their own systems. In Mali, free inventory could not induce local store owners to get into the spare parts supply business. Local merchants were unwilling to provide the credit that villagers thought they needed, sales volumes of spare parts were far lower than anticipated because there was no private demand for handpumps, and pipes and other equipment required large storage capacities that could be more profitably used in a range of other enterprises. Supporting local manufacture of pumps was also problematic in Mali (see Box 6.1).

In Paraguay, in contrast, the experience with private sector O&M providers has been much more positive, perhaps because those providers entered the business of their own volition and there is a market for pipes and submersible pumps. Service providers in Paraguay generally concentrate on three aspects of system operation: electrical metering and circuitry, electric pump repair, and removal of tubing and submersible pumps from deep wells. In all these activities, local water groups were a new market for businesses that were already in the business of serving an existing group of commercial and residential customers.

Monitoring and Evaluation

In Bank RWS projects, monitoring should be a management tool for project implementing staff. The institutional responsibilities for monitoring and evaluation (M&E) should be addressed during project preparation. When the appraisal team does not weigh (a) the adequacy of the proposed M&E system and (b) the appropriateness of separating the entity responsible for evaluation from the implementing agency, the ability of the implementing agency to critically evaluate its own work is in jeopardy.

M&E is not much used in RWS projects yet. When the study held an evaluation workshop in Rajasthan, several staff said it was the first evaluative activity undertaken by the project. During the implementation phase, supervision missions should do more to coach

Box 6.1. The High Costs of Supporting the Local Manufacture of Handpumps

The Mali project specifically chose to use the India Mali pump, not only because it lent itself to village-level operation and maintenance but also because it was the only pump manufactured in the country. While it is too early to say whether long-term benefits will accrue from supporting local enterprise, the cost to the project and its beneficiaries has been significant.

It was assumed that spares would always be available from the Enterprise Malienne de Maintenance (EMAMA). In the interim, the factory has been semi-privatized and its management has changed. This has led to a loss of creditworthiness and of personnel with essential knowledge and contacts. The factory is currently unable to fill orders for spares, and its survival is in question. The same pump is (and always has been) available in India. Complete units and spare parts can be purchased there and shipped to Mali for less than half the cost of those manufactured in Mali. Pumps and spares are imported tax-free, while the iron that EMAMA imports from Europe for local casting is heavily taxed, ostensibly because the metal could be used for any manufactured product.

A foreign contractor was selected to install a certain number of pumps paid for by villagers' contributions. The contract was let based on local prices for EMAMA equipment on the unspoken understanding that the contractor would support project procurement policies, but the company bought its units in India, retaining a profit larger than anticipated.

clients in the use of monitoring as a management tool to collect data, track project performance, and analyze and evaluate the results. Project indicators should be defined by or in collaboration with the implementing agency. Client investment in and understanding of the rationale for any data collection activities are vital if indicators are to be usefully and reliably collected. Sensitivity to project impacts on intergender division of labor and gender-specific gains and losses is also a must.

The indicators of development used by most RWS projects focus more on the numbers and types of RWS infrastructures to be completed and number of people who will benefit from the program than they do on development impact. This makes it difficult to monitor or assess, for example, the health impact of these projects. The Karnataka and Maharashtra projects were exceptions in this sense (see Annex A); project documents include indicators to monitor the expected health impact (like the hygienic upkeep of WSS facilities and percentage decrease in disease incidence) of the various project activities.

The strategic approaches used in RWS projects include demand-driven or demand-responsive, institutional capacity building, and community participation. Indicators need to focus on project impacts in these areas as well as their achievements. A set of suitable indicators are as follows:

- health benefits,
- improved household and community environmental sanitation,
- improved hygiene practices,
- improved coverage,
- equitable access,
- hygienic use of WSS services,
- poverty alleviation by enhancing productivity,
- more efficient use of time saved in collecting water,
- measures of technical assistance effectiveness, and
- sustainable scheme management and maintenance.

The choice of indicators needs to be governed by the baseline data that are possible and practical to collect. Making good use of indicators already being collected outside of the project (such as official health data) makes the task substantially easier and permits comparisons between areas not yet served with those benefited. Indicator systems seen as too complex or irrelevant are unlikely to become operational. Project Process Indicators measure what actually happened during project implementation and are therefore benchmarks for measuring progress toward specific project targets. Simple mechanisms such as the standardization of data reporting forms, where multiple institutions are involved, can ensure effective supervision.

Chapter 7

Lessons and Recommendations

Past performance does not determine future results. The Bank has engaged in a very effective learning process; a series of evolving approaches to RWS have helped to overcome the mistakes of the past. And the Bank is working in some new ways that are so recent that results, although promising, are not yet conclusive. The Community Water Supply and Sanitation Conference held at the Bank in May 1998 supported a new framework for sustainable community planning and management of village systems (the DRA). To some degree, ongoing rural water projects using DRA are structured differently from the completed ones OED studied. Unfortunately, there are no completed DRA projects to evaluate at this stage. Nevertheless, a backward look at about half of all completed projects sheds light on the nature of the challenge that these new RWS projects will face as they encourage even more local involvement with management and design. Some of the new rules by which DRA projects are implemented are consonant with the study findings. For this summary, study findings have been grouped into four main conclusions, as follows.

Lesson 1: A longer-term presence than was generally provided for under most projects is required to leave behind an organization that can maintain the water point or piped system, administer the water scheme in a financially responsible manner, and handle routine O&M.

In other words, it is easier to construct a water system than to leave in place a local organization capable of technically and financially managing it.

Recommendations:

- Analyzing how villages supply themselves with services similar to water supply should be an important part of project preparation. The Bank needs to avoid promoting internationally generalized prototypes and begin organizing and financing projects that imitate successful village behavior in the proposed project areas.
- Training needs to support local capacity, which tends to increase slowly. It should not be limited to the preoperation phase.
- Projects need to fund support for local groups until they can perform all of their functions without further assistance. The required assistance evolves, but it usually has three phases: preconstruction community organization, including rules development; construction monitoring and supervision; and O&M and management assistance until the village organization can function independently.
- Intervisitation between villages is usually productive and should be systematically encouraged. Having members of less-well-run organizations visit more successful ones nearby proved helpful in most countries studied. Borrowing successful administrative techniques, whether they were card filing systems, printed forms, or computer programs,

allowed laggards to leapfrog over developmental hurdles.
- Projects that depend upon community management need to give much more attention to training in administration. Administrative tasks were everywhere a challenge.
- Local ownership of infrastructure was associated with the stronger local organizations. The most stable local organizations were legally recognized water committees that own significant and visible property.
- The maintenance of office hours meant that users could be sure of finding someone to listen to their problems at the end of a long walk.

Lesson 2: The lack of proper attention to institutional development means that governments must return to beneficiary communities to rehabilitate what they have provided.

Even though rural water projects have made great strides in getting villagers to cover more of their systems' operating costs, nowhere in the world did the study find a majority of beneficiary communities ready to cover the costs of a major overhaul or the complete replacement of their systems' most expensive components. And only in China was there full cost recovery. In most of the countries studied, if communities raise tariffs to cover equipment replacement at too late a date, they would be inordinately high, which would likely drive people back to traditional sources. Some countries have developed the "water fund" idea to support communities with this type of problem. In other countries, a policy based on designed lifespans has been used.

Recommendations:
- Use Learning and Innovation Loans and Adaptable Project Lending to better calculate true long-term system operating costs. Ultimately, it is in the interest of users to replace expensive infrastructure (such as pumps) before the end of their useful life and not months or years after. Committees that cover the full cost of water supply ultimately provide better service to members.
- Follow-on projects need to include subcomponents to provide follow-up support to local organizations, potentially supplemented by short-term credits for equipment replacement.

Lesson 3: Rarely will one level of service meet all village needs.

RWS projects should treat villages and small towns (population of more than 2,000) differently. Villages and towns often aspire to service of different standards. In recent years, aspirations have steadily risen, even in very poor countries. Whereas rural villages are often quite dispersed and improved point sources may be in line with local aspirations and willingness-to-pay, small towns lend themselves better to motorized, piped systems. People in small rural towns have little incentive to participate in water-providing local organizations if the service they are going to receive does not meet their aspirations. There is also a financial justification for respecting local willingness-to-pay when the community wants to aim high: under many projects' rules there is a chance that government subsidies will be lost by waiting. Maximizing house connections and yard taps (based on felt needs and real demand, of course) fulfills community aspirations and creates the possibility of collecting enough money through fees and tariffs to attract a private operator. If that is not feasible, higher service levels permit sustain-

able community ownership or make the continuing existence of a local water committee worthwhile. Realizing the full potential benefits of RWS investments will require cataloging local differences and matching services to meet them as necessary. However, house connections are going to remain a dream for most rural dwellers in Africa because funding the initial investment is a bottleneck for most governments.

Recommendations:

- When system design and local topography warrant such an approach, it is better to design for full coverage and to levy a significant surcharge on latecomers for each system expansion.
- When potable water is available out of standpipes (shared faucets) rather than hand pumps, the health benefits of projects seem to increase. This is especially true, of course, where surface water or unsafe shallow wells are present.

Lesson 4: To improve project outcomes, Bank-financed interventions have to be carefully adapted to the social characteristics of each village served.

Just as no single level of service can meet the aspirations and budgets of all villages and villagers, having but one approach to local institutional capacity development is not enough. The strongest and weakest village organizations in each project studied are separated by a large gap. The biggest difference between highly successful village water service-providing institutions and less successful ones is income, a result of tariffs being greater than costs. But even before the various villages had water organizations, the chances are good that they had differing levels of social capital. While recognizing and applauding the current Bank commitment to financially sustainable RWS, it is a goal that should be approached incrementally. The study found that even the minimal costs associated with current community-based and demand-responsive projects are too high for a subset of the target population. Raising water prices in order to improve cost recovery would probably cause more families to drop out and could potentially leave revenue levels much the same.

Water supply systems are more likely to be sustainable, and subsidies to yield a better result, in better-organized villages. In villages with low levels of social organizational capacity (social capital), support may be required for activities that precede water work before the community can make good use of a water subsidy. Practitioners widely agree that villagers who use a rural water system must be responsible for its O&M costs. In the sample studied, increased participation of villagers in the operation of the system usually reduced levels of subsidy, but it did not eliminate them. Therefore, governments should differentiate between villages with high and low levels of social capital and begin work with each one in a more carefully tailored fashion, making sure that they know how to participate effectively (keep books, run meetings and elections, handle correspondence and other contacts with public officials, etc.) in a service-providing organization before insisting on entrepreneurial management.

Recommendations:

- Project designers need to pay close attention to existing levels of social capital in communities, and must adjust the approach to service delivery accordingly.

- Raising water prices in order to improve cost recovery has to be done sensitively, in frequent small increments, so that it does not cause large numbers of families to drop out and potentially leave revenue levels much the same. Tariffs need to be set at sustainable levels. While the village committees are in the business of providing an affordable service to their members, too many committees do not understand the full cost of the service they provide.

Annex A

The Role of the Bank in Rural Water Supply

World Bank lending to stand-alone RWS projects grew from an average of one project a year in the 1980s (Table 1) to a steady two to three projects a year in the 1990s (Table 2).[30] Overall, Bank lending to rural water projects in the 1980s was on the order of $334.5 million. From 1990 through the end of calendar 1998, lending for free-standing rural water projects totaled $1,090 million, more than $120 million per year (Figure 1).

The Bank's share of total project costs has increased from about 46 percent in the 1980s to some 63.5 percent over the past eight years, indicating that smaller and lower-income countries are getting involved. The lending program for the next two to three years shows a projected further doubling of annual lending. Part of this increase is attributable to the fact that countries that have traditionally borrowed on a large scale (China, India, Indonesia, and Pakistan) have applied for loans for large RWS projects ($100 million or more). The scale of projects in Africa and the Middle East and North Africa typically has been much smaller, on the order of $50 million or less, which reflects the implementation capacity of sector agencies in those regions.

Free-standing rural water projects are just part of the story. Rural water subcomponents commonly appear in urban WSS projects, and they often represent a significant percentage of total project costs in rural development and agriculture projects. Social funds are another source of financing for rural water, although they commonly use different methodologies, rules, and standards (see Table 3).

Figure 1. Rural Water Lending 1970–2003

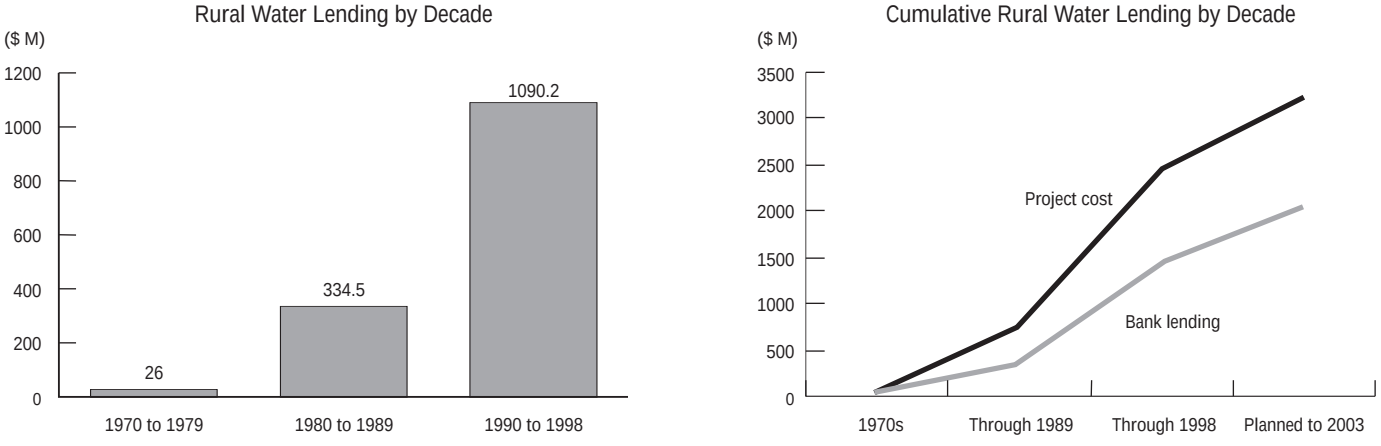


Table 1. Completed Free-Standing Rural Water Supply and Sanitation Projects

Country	*L/C No.*	*Project Name*	*L/C ($M)*	*Project Cost ($M at Appraisal)*	*Board Approval*	*Closing Date*
Paraguay	L1502-PA	Rural Water Supply I	6.0	12.5	12/13/77	6/30/83
India[a]	C1046-IN	Rajasthan WS&S	80.0	191.1	6/19/80	12/31/88
Paraguay	L2014-PA	Rural Water Supply II	11.8	20.8	6/16/81	3/20/90
Tunisia	L2134-TN	National Rural Water Supply	30.5	59.6	4/27/82	12/31/87
Philippines	L2206-PH	Rural Water Supply	35.5	38.7	10/19/82	6/30/90
Zambia	C1362-ZM	Rural Water Supply	16.0	21.6	5/12/83	9/30/91
Mali	C1431-ML	Water Supply I	10.9	11.9	12/20/83	6/30/93
China	C1578-CN	Rural Water Supply I	80.0	210.2	4/11/85	12/31/91
Brazil	L2532-BR	Pilot Rural Water and Sanitation	16.3	32.5	5/11/85	9/30/90
Burundi	C1625-BI	Water Supply Sector	9.5	10.9	9/10/85	12/31/91
India[a]	C1622-IN	Kerala WS&S	29.0	85.14	9/24/85	10/31/94
Philippines	L3242-PH	Water Supply Sewer and Sanitation	45.0	132.0	6/28/90	12/3/97
India	C2234-IN	Maharashtra Rural Water Supply	109.9	142.5	5/2/91	6/30/98
Paraguay	L3519-PA	Rural Water Supply III	22.8	36.3	9/10/92	6/30/98
Sri Lanka	C2442-CE	Community WS&S	24.3	32.3	12/12/92	12/31/98
Total			**527.5**	**1038.04**		

Note: Excludes Kenya Rural Water Supply I, 1637-KE, a credit of $20 million, because the project was not implemented. Six percent of the total appraised loan amount was ultimately cancelled.

a. Predominantly rural but with some peri-urban components.

Table 2. Ongoing Free-Standing Rural Water Supply and Sanitation Projects

Country	*L/C No.*	*Project Name*	*Fiscal Year Approved*	*L/C ($M)*	*Project Cost ($M)*
AFRICA					
Rwanda	1783-RW	Water Supply II	1987	15.0	72.2
Burundi	2288-BI	Water Supply Sector[a]	1992	32.7	55.0
Benin	2622-BJ	Rural Water Supply and Sanitation	1994	9.8	15.0
Ghana	2604-GH	Community Water and Sanitation	1994	22.0	27.0
Uganda	2583-UG	Small Towns Water	1994	42.3	55.8
Madagascar	3025-MG	Rural Water Sector Pilot	1998	17.3	22.3
EUROPE AND CENTRAL ASIA					
Turkmenistan	4171-TM	Water Supply and Sanitation	1997	30.3	33.7
Uzbekistan	4216-UZ	Rural Water Supply and Sanitation	1998	75.0	117.0
EAST ASIA AND PACIFIC					
China	2336-CN	Rural Water Supply and Sanitation II	1992	110.0	189.0
Indonesia	3629-ID	Water and Sanitation for Low Income Communities	1993	80.0	123.3
China	N027-CN	National Rural Water III	1997	70.0	140.0
LATIN AMERICA AND THE CARIBBEAN					
Bolivia	2806-BO	Rural Water Supply and Sanitation	1996	20.0	48.0
Paraguay	4223-PY	Rural Sanitation	1998	40.0	110.0
MIDDLE EAST AND NORTH AFRICA					
Yemen	2170-YE	Tarim Water Supply	1990	12.0	15.0
Yemen	2913-YE	Taiz Water Supply Pilot Project	1997	10.2	11.1
Morocco	4254-MA	Rural Water Supply and Sanitation	1998	10.0	57.0
SOUTH ASIA					
Pakistan	2228-PK	Rural Water	1991	136.7	194.2
India	2483-IN	Karnataka Water Supply and Environment/Sanitation	1993	92.0	118.0
India	4056-IN	Uttar Pradesh Rural Water	1996	59.6	71.0
Nepal	2912-NP	Rural Water Supply and Sanitation	1997	18.3	21.2
Total				**903.2**	**1495.8**

a. $26.8 million cancelled.
Source: Water and Sanitation Division, World Bank.

Table 3. Rural Water Components in Other Projects

Country	*L/C No.*	*Project Name*	*Fiscal Year*	*L/C ($M)*	*Project Cost ($M)*
OTHER WATER PROJECTS					
Nigeria	2372-NG	Multi-State Water I	1992	101.0	175.0
Morocco	3664-MA	Water Supply	1994	160.0	353.6
Malawi	2753-MW	National Water Development	1995	79.2	79.2
Ethiopia	2841-ET	Water Supply Development and Rehabilitation	1996	35.7	35.7
Venezuela	4031-VE	Monagas Water and Sanitation	1996	39.0	180.0
Kazakhstan	4129-KZ	Water Project	1997	7.0	7.4
Mozambique	3039-MZ	National Water I	1998	36.0	37.2
SOCIAL FUND PROJECTS					
Zambia	2273-ZM	Social Recovery Project I	1991	20.0	48.7
Burundi	2494-BI	Social Action	1993	10.4	15.7
Bolivia	2532-BO	Social Investment Fund II	1993	40.0	70.0
Albania	2680-AL	Rural Development	1995	6.0	12.0
Zambia	2755-ZM	Social Recovery Project II	1995	30.0	65.0
Armenia	2784-AM	Social Development Fund	1996	12.0	20.0
Egypt	2865-EG	Social Investment Fund II	1996	120.0	775.0
Eritrea	2823-ER	Community Development Fund Project	1996	17.5	49.7
Ethiopia	2841-ET	ESRF I	1996	120.0	120.0
Honduras	2766-HN	Social Investment Fund III	1996	30.0	112.6
Madagascar	2778-MG	Social Fund II	1996	40.0	45.0
Malawi	2856-MW	Social Action Fund	1996	56.0	65.0
Panama	4191-PA	FES	1997	28.0	80.0
Benin	3073-BJ	Social Fund	1998	16.7	19.5
Georgia	3020-GE	Social Investment Fund	1998	20.0	28.3
AGRICULTURAL AND OTHER PROJECTS					
Mozambique	2337-MZ	Agricultural Rehabilitation	1992	35.0	41.0
Indonesia	3588-ID	Groundwater Development	1993	54.0	84.9
Benin	2061-BJ	Community Based Food Security Project	1994	9.7	19.1
Indonesia	3755-ID	Integrated Swamps Development	1994	65.0	106.0
Indonesia	3888-ID	Village Infrastructure Project	1995	72.5	83.8
Cote d'Ivoire	N0220-CI	Rural Land	1997	41.0	60.1
Ghana	N0200-GH	Village Infrastructure Project	1997	30.0	60.0
Brazil	4252-BR	Maranhao Rural Poverty	1998	80.0	80.0
Brazil	4251-BR	Paraiba Rural Poverty	1998	60.0	117.0
Indonesia	4330-ID	Kecamatan Development	1998	225.0	225.0
Indonesia	4306-ID	Maluku Regional Development	1998	16.3	20.5
Indonesia	4100-ID	Village Infrastructure II	1998	140.1	159.6
Total				**1853.1**	**3451.6**

Note: Although a spot check showed that it is quite usual for water components to reach 30-40 percent of total project costs, the percentage allocated to rural water was not determined because of incomplete data.
Source: Water and Sanitation Division, World Bank.

Annex B

Cost per Capita for Water Supply in Bank Projects Studied

		Appraised Cost		*Actual Cost*		
Project	*Number of People Served*	*Project (US$M)*	*Per Capita (US$)*	*Project (US$M)*	*Per Capita (US$M)*	*Type of System*
Paraguay I	122,000	10.6	86.89	12.5	102.46	Piped
India-Rajastan	1,700,000	191.1	112.41	222.8	131.06	Mixed
Paraguay II	170,000	20.8	122.35	16.7	97.94	Piped
Tunisia	374,000	64.1	171.28	64.5	172.46	Piped
Philippines I	2,777,000	58.4	21.24	45.1	16.40	Handpump
Zambia	210,000	21.6	102.86	20.9	99.52	Mixed
Mali	228,000	11.9	52.19	13.0	57.02	Handpump
China	7,430,000	210.2	28.29	267.0	35.94	Handpump
Burundi	581,200	10.9	18.75	13.7	23.57	Piped
India-Kerala	1,200,000	85.1	70.95	56.1	46.75	Piped
Philippines II	1,882,000	132.0	70.14	82.8	44.00	Handpump
India-Maharashtra	1,700,000	140.8	82.82	142.5	83.82	Mixed
Paraguay III	250,000	36.3	145.20	34.0	136.00	Piped
Sri Lanka	650,000	32.3	49.69	33.0	50.77	Mixed
Total	**19,274,200**	**1,026.14**		**1024.6**		
Average			**53.31**		**53.23**	

Note: Some projects include costly components other than water supply.

Endnotes

Chapter 1

1. World Bank, *Summary Proceedings*, 1973 Annual Meetings of the Board of Governors, Washington, D.C. (December 1973).

2. World Bank, *African Water Resources*, Technical Paper 331, Washington, D.C. (1996).

3. Maggie Black, *Learning What Works: A 20 Year Retrospective View on International Water and Sanitation Cooperation*, UNDP–World Bank Water and Sanitation Program (1998).

Chapter 2

4. *An Evaluation of the UNDP–World Bank Water and Sanitation Program: Report of an Independent Team* (1996).

5. Repeater projects are under preparation for China, Ghana, Indonesia, and Sri Lanka.

6. The Côte d'Ivoire project was not funded by the Bank, but rural water supply policy reforms were part of a Bank-funded Water Supply Adjustment Loan.

7. "Etudes de Rehabilitation des Point d'Eau Existant," Diwi Consult and Bureau d'Ingenierie pour le Developpement Rural (August 1984).

8. *An Evaluation of the UNDP–World Bank Water and Sanitation Program: Report of an Independent Team* (1996).

Chapter 3

9. Data are available for Adoor, GCDA, Kottayam, Puthencruz, and Vilappil project areas.

10. Calculations made on the basis of available data for four of the five panchayats covered by the project.

11. Basic data for calculating an increase in population in the project area are from project documents. For lack of panchayat data, population data used are for the whole project area, even though information on incidence of disease was for four of five panchayats.

12. The official figure of $110 is a product of high design standards and support costs, although it probably does not fully reflect the cost of SENASA follow-up.

13. Almost all committees studied had been functioning for over a year.

Chapter 4

14. Although PSD is a separate issue, government was kept out of the supply chain to the extent possible.

15. Mike Garn, "Managing Water as an Economic Good," World Bank, Washington, D.C. (no date).

16. The districts of Badulla, Matara, and Ratnapura.

17. Sri Lanka Impact Evaluation, Report 18113.

18. During project preparation, consumer surveys were conducted, and pilot schemes were implemented with the assistance of experienced NGOs. The rules were established on the basis of the survey results and experience gained from the pilot schemes.

19. Except for tube wells, for which the minimal contribution would be 10 percent.

Chapter 5

20. Effective village-level organizations exist in China and they are consulted by officials in most matters that concern their village.

21. Most Karnataka villages have committees.

22. For more on this topic, see Tapio Katko, "The Need for Project Champions in Rural Water Supply," *Waterlines,* Intermediate Technology Publications 12 (1993).

23. Jonathan Isham and Satu Kahkonen, "Institutional Determinants of the Impact of Community-Based Water Services: Evidence from Sri Lanka and India," OED Discussion Paper, World Bank, Washington, D.C. (1999).

24. Deepa Narayan and Lant Pritchett, "Cents and Sociability: Household Income and Social Capital in Rural Tanzania," Policy Research Working Paper 1796, World Bank, Washington, D.C. (1997).

25. Indicators of the prevailing level of social capital were the following: the number of community groups and associations; household participation in these groups; heterogeneity of group members with respect to age, gender, caste, religion, and occupation; and other community activities and networks.

26. Kseniya Lvovsky, Gordon Hughes, and Meghan Dunleavy, "Andhra Pradesh, India: Investing in People Through Investing in Water," World Bank, Washington, D.C. Photocopy.

Chapter 6

27. In China the central government recovered the loan amount from the subborrower, but the study was unable to ascertain whether the payments were made with money raised by water charges.

28. Bank practice in the more recently approved DRA projects no longer follows the "transfer" approach: communities initiate, plan, implement, own, and manage their systems.

29. Some juntas have expanded coverage to neighboring villages.

Annex A

30. Except for 1995.