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Sri Lanka
Impact Evaluation Report
Community Water Supply and Sanitation Project (Credit 2442-CE)

June 30, 1998

Operations Evaluation Department

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Currency Equivalents

Currency unit	=	*Sri Lanka Rupee (SLR)*	
July 1992, at appraisal	US$1.00	=	SLRs 44.0
January 1998, at survey	US$1.00		SLRs 61.6

Abbreviations and Acronyms

DDP	District Development Plan
ERR	economic rate of return
GNP	gross national product
GOSL	Government of Sri Lanka
IDA	International Development Association
IER	Impact Evaluation Report
lcd	liters per capita per day
MOH	Ministry of Health
NGO	nongovernmental organization
NWSDB	National Water Supply and Drainage Board
O & M	operation and maintenance
OED	Operations Evaluation Department
OMS	Org-Marg-Smart, Survey and Market Research Team Ltd, Sri Lanka
RWS	Rural Water Supply
UNDP	United Nations Development Program
W & S	water and sanitation

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Office of the Director-General
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MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Impact Evaluation Report on Sri Lanka Community Water Supply and Sanitation Project (Credit 2442-CE)

The Community Water Supply and Sanitation Project (Credit 2442-CE for US$24.3 million) was approved in FY93 and is scheduled to close on December 31, 1998. This OED impact evaluation was conducted before credit closing to learn early lessons from an innovative project for a global audience, as well as to benefit the consolidation phase of this project and the preparation of a follow-on operation. This was a high-priority operation for Sri Lanka and integral to the government's strategy of providing infrastructure support to the districts of Badulla, Matara, and Ratnapura—a zone where the lack of services had become more severe than elsewhere, and lack of investment strained available water system resources. The strategy of the project was to increase beneficiary involvement (including that of women) through the use of existing local groups and, where there were no functional groups, to promote new, community-based organizations to take charge of the development, implementation, and O&M of new water supply and sanitation facilities. The project promoted self-help, self-reliance, and sustainable water and sanitation strategies.

The evaluation was conducted in two phases. During a pilot phase the study team reviewed available background data, developed and field tested the data sheets and questionnaires, elaborated household selection criteria, identified the appropriate sample size and composition, and conducted pilot focus group and community interviews. In the second phase, the study fielded teams of local researchers to administer questionnaires on the household and village levels, collect secondary data, and fill out technical data sheets on each district and village visited and the operations of its water system. Data were collected from 20 Sri Lankan communities (18 project villages and 2 control villages) through a survey of about 380 households and 18 water committees.

The study constitutes a partnership between OED and the Center for Institutional Reform and the Informal Sector (IRIS) at the University of Maryland. IRIS staff carried out the data analysis, contributed sections to the report, and prepared a background paper on social capital. The evaluation shows that when pre-project social capital levels are high, communities generally have better performing schemes: households in communities with the best-performing services belong to a larger number of

community groups than households in the worst-performing category, and the membership of the better-performing groups is also more heterogeneous regarding religion, occupation, and gender. Also, collection ratios and cost recovery were most advanced in communities where household participation in the design and construction of the scheme was high. The economic benefit of time saved in collecting water is estimated at 20 percent of average family income. Finally, the impact on public health in those communities with the best-performing schemes is stronger than in communities with the worst-performing ones. Almost half of the households in communities with the best-performing schemes and only a quarter of the households in communities with the worst-performing ones reported that their family's health had improved since the new schemes started functioning.

The evaluation also finds that Bank support for the rural water supply schemes in Sri Lanka is making a significant difference in the quality of life in project villages. The rural water infrastructure is in place and functioning. Sanitary conditions have improved substantially. The achievements and impacts of the project are considerable. The various schemes are helping to reduce the deficit in rural water supply, fostering local organizational capacity, and increasing water coverage. In the best villages coverage has reached 98 percent and use of pour-flush latrines is nearly universal.

The results of this study provide strong evidence that involvement of users in all aspects of water supply system development, implementation, and O&M improves sustainability. Women's involvement in system management proved to be critical for performance: women, as the primary water collectors in most rural households, have the most interest in ensuring that the water and sanitation service is designed to match their needs and performs well.

The study finds that project designers need to pay close attention to existing levels of social capital in communities, and adjust the approach to service delivery accordingly. In communities with low levels of social capital, special efforts may be necessary to motivate and mobilize community members if water systems are to operate sustainably. In addition to the general lessons generated by the study (*inter alia* on the importance of adequate social mobilization, project rules, and hygiene education; and the efficacy and effectiveness of the community-based approach), policy recommendations include the advisability of respecting beneficiary aspirations for high standards of service. Maximizing house connections and yard taps (based on perceived needs and real demand) both fulfills community aspirations and creates the possibility of collecting enough money through fees and tariffs to make a local water committee worthwhile. Factors such as participation in multiple community activities by water committee members, participation in system design, participation in system construction, improved beneficiary health, and satisfactory participation in the water group by women are all positively related to above-average financial management and cost recovery. Consequently, during water and sanitation project design, special attention needs to be given to these and related areas.

Contents

All aspects of the study were conducted under the supervision of Mr. Tauno Skytta, Task Manager. This report was prepared by Mr. Ronald Parker (Evaluation Officer). Ms. Reno Dewina and Mr. Gary Wu (Consultants) provided research support. Ms. Satu Kahkonen and Mr. Jonathan Isham of IRIS carried out the data analysis, contributed sections to the report, and prepared a background paper on social capital. The survey was carried out by OMS in Sri Lanka. Mr. William Hurlbut edited the report, and Ms. Helen Watkins provided administrative support.

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Preface

This Impact Evaluation Report (IER) assesses the medium- and long-term impacts of the rural water infrastructure constructed with the proceeds of the Community Water Supply and Sanitation Project credit (Cr. 2442-CE). The US$24.3 million International Development Association (IDA) credit was approved on December 12, 1992, and is scheduled to close on December 31, 1998.

The IER was prepared by the Operations Evaluation Department (OED) of the World Bank. OED's study team visited Sri Lanka in November and December 1997 and conducted on-site inspections in 18 project villages in 2 provinces. Villages were randomly selected—only those water schemes with a minimum of one year in operation were taken into account. In general, the selected villages cover the entire implementation period (from 1992 to the present). In both provinces the study team met with national and district level officials, in each village the local water committee was interviewed, and questionnaires were administered to randomly selected households. The facilities constructed with the proceeds of the loans were also visited, and a technical evaluation conducted.

The study team extends its gratitude to Brian Grover for his helpful comments on the work in progress. The survey was conducted by Org-Marg-Smart (OMS), Sri Lanka and the data analysis was done by IRIS, University of Maryland. The purpose of the exercise was to assess the impacts and to examine the relevance of the Bank's assistance program on the performance of the rural water supply and sanitation sector in Sri Lanka, as well as to compare areas that had benefited from previous interventions with those areas yet to be served. Research in the field was conducted over a period of about one year. The study team particularly wishes to acknowledge the many contributions of Miriam Witana (World Bank Resident Mission), K.M. Minnatullah (RWSG-SA), Harsha De Silva (OMS), and the project staff in Sri Lanka.

Copies of the draft IER were sent to the officials and agencies of the GOSL for review and comment, but no comments were received.

1. Study Methodology and Project Context

The Impact Evaluation Study

1.1 The main objectives of the Sri Lanka impact evaluation are to assess the impacts and to examine the relevance of the Bank's assistance program on the performance of the rural water supply and sanitation sector in Sri Lanka. The study focuses on one project: the Community Water Supply and Sanitation Project (Credit 2442-CE).

Country Context

1.2 Sri Lanka is a densely populated island nation of about 18 million people of the southern tip of India. It is blessed with a diverse agricultural base and rich flora and fauna. Since independence in 1948, the country has made impressive social gains despite its low per capita income. Its literacy and primary school enrollment are virtually universal, and the country has an unbroken record of democracy. Sri Lanka's GNP in 1996 was US$740, with an average real growth rate of 3.4 percent since 1990.

1.3 Sri Lanka's population by mid 1995 was estimated at 18.1 million,[1] of which about 80 percent is rural. Free education since independence has led to a high literacy rate compared to neighboring countries (91 percent for men and 83 percent for women). The population growth rate has steadily declined, reaching 1.3 percent between 1990–95. Health statistics in Sri Lanka are comparable to industrialized countries, largely owing to high educational levels, free medical services, and a healthy climate. Life expectancy at birth (72 years) and infant mortality rate (34 per 100,000 live birth in 1980 and 16 in 1995) are far better than the statistics from other South Asian countries.

1.4 With its human resource base and natural endowments, Sri Lanka could have achieved the growth records of its East Asian neighbors had it not been for a history of ethnic conflict, political violence, and erratic economic policies—the country has been on and off the economic reform path since 1977. The state still accounts for a quarter of total employment (civilian and military). It also owns more than 70 percent of all land and intervenes heavily in agricultural trade and pricing. Four percent of the population lives on less than $1 a day (1981–95).

1.5 Since 1954, IDA has maintained a fairly strong presence in Sri Lanka, and its lending was particularly significant during the major liberalization period after 1977. As of December 31, 1997, IDA had approved 87 credits totaling about US$2.4 billion. Of the four projects in the water and sanitation sector (total credits of US$100.5 million, or 4.2 percent of total lending) only one project was for rural water supply (US$24.3 million, or about 24 percent of water sector lending). The World Bank–funded water projects in Sri Lanka have been: Water Supply I (Credit 709-CE), Water Supply II (Credit 1041-CE), Water Supply and Sanitation (Credit 1700-CE), and—the subject of this study— Community Water Supply and Sanitation (Credit 2442-CE).

1. World Development Report 1997; The World Bank.

Rural Water Supply and Sanitation in Sri Lanka

1.6 Before the project, rural water initiatives could be characterized as subsidized self-help. In the three districts covered by the project, funding mini-solutions through local initiatives has been something of a tradition. Historically, about one third of rural water investments has been covered by public funding (provided by various government agencies) with the remainder being raised from the contributions of private households, local organizations, and local government, in some cases jointly.

1.7 Population pressure on land (away from the conflict zone) and an expensive and long-festering civil war, reduced government per capita expenditures on basic services, however, and often produced deteriorating living conditions and an increase in the incidence of various (often water-related) diseases. This deterioration in water supply and access to adequate environmental sanitation tends to be more of a problem in rural areas; though in areas that are not densely populated, disease vectors may self-limit with just the use of primitive latrines. As many as 80 percent of all children have some form of diarrheal disease (including common diarrhea) annually. About 80 percent of the population had access to safe water and 69 percent to adequate sanitation in 1994–95. In the rural areas, the corresponding figures for water are slightly lower (79 percent) but slightly higher for sanitation (70 percent). Rural statistics tell more about access than quality, however, and the above figures probably include unprotected shallow wells and traditional pit latrines.

1.8 To give a more accurate idea of the state of *water supply* coverage in the project area at project inception, minimum standards must be applied. Minimum acceptable household service levels are defined as consisting either of piped systems, protected wells, or wells with handpumps within 250 meters of the dwelling unit. Project staff estimate that acceptable coverage was about 46 percent for the whole project area. Matara had the highest coverage (59 percent), followed by Ratnapura (46 percent), and Badulla (34 percent).

1.9 As for *sanitation* coverage, about 81 percent of the households in the three project districts had some type of latrine before the project. However, many latrines were not in good condition: even those made of sticks and sheet plastic are counted; some provide unacceptable sanitary conditions (no reduction of disease vectors, free passage for insects, and unvented odors). When only those at acceptable hygiene levels are taken into account, estimates of coverage in the project area are reduced to about 40 percent.

1.10 The *institutional framework* of the water sector in Sri Lanka is complex. The responsibilities for rural water supply (RWS) rests with a number of agencies. The key agencies in the project districts are the National Water Supply and Drainage Board (NWSDB) and the Ministry of Health (MOH). The NWSDB is responsible for development of all rural piped and non-piped water supplies. The MOH is responsible for sanitation and for health education. Institutional arrangements are further complicated because district councils (*Pradeshya Shaba*) have responsibility for the operation and maintenance (O&M) of completed facilities. Although nongovernmental organizations (NGOs) have been active in the rural water subsector, they have functioned primarily as catalysts for community participation, promoters of self-built shallow wells and latrines.

Government Commitment to the Water Sector and Strategy

1.11 Before the Bank-financed project, several constraints hampered attempts to promote progress in rural areas and in the water sector. 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. Scheme-specific tariffs appear to be a more sustainable and effective way to operate, as evidenced by some community-managed schemes (see discussion of cost recovery in *para. 2.22*).

1.12 Sri Lanka was one of the 115 countries that adopted the New Delhi Statement,[2] committing itself to full rural coverage by the year 2000, a range of institutional reforms, and economic and social policies that facilitate coverage and increase efficiency. Other New Delhi commitments include the use of appropriate (low-cost) technologies and the mobilization of funds from local sources. The preparation of District Development Plans (DDP) is central to the government strategy, and investments in rural water are planned to increase until they reach about 5 percent of total development expenditure.

Study Methods

1.13 The study began in November 1997 with a pilot phase during which different teams reviewed available secondary data; tested the data sheets and questionnaires; developed household selection criteria; identified the appropriate sample size and composition; and conducted pilot focus group and community interviews. Following intensive training, the study fielded teams of researchers to administer questionnaires on the household and village levels, collect secondary data, and fill out technical data sheets on each district and village visited and the operations of its water system. Data were collected from 20 Sri Lankan communities[3] (18 project villages and 2 control villages) through a survey of about 380 households and 18 water committees.In addition, borrower agencies, and NGOs working in Sri Lanka were interviewed.

1.14 Within the areas surveyed, the study compiled a list of all villages that have had access to potable water through the project for at least a year. Final selection of villages was random, as was the selection of neighborhoods and households to be polled. The interviews were conducted at times that were convenient to the villagers to ensure the maximum participation of both women and men. To complement the data collected by the questionnaires, the study teams held focus group meetings with the local water committees and beneficiary groups to gather their opinions on the quality of service, to collect information about problems with system design or social interaction, and to identify elements that contribute to the success or failure of rural water schemes.

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2. At the UNDP Global Consultation on Safe Water and Sanitation for the 1990s, held in New Delhi in September 1990.

3. The survey was conducted by the OED team in two of the three project districts, Matara and Ratnapura. The GOSL agreed to carry out a similar survey in the Badulla district but the results of this survey have not been received as of the date of this report.

Questions Studied

1.15 The study addresses questions related to outcome and impact in three areas: project preparation, project design, and implementation. The principal project-related research questions are as follows:

Project Preparation

- What has been the involvement of local institutions in the preparation process?
- What are the characteristics of the project institutional framework? To what degree was the project supply or demand driven? How are these factors associated with success or failure?
- What has been the participation of local stakeholders?
- How was the water extraction technology chosen? Was the participation of local stakeholders in technology selection adequate?

Project Design

- What is the relationship between eligibility criteria, nature of village contributions, the delegation of work and responsibility, cost recovery, and observed project outcomes.
- To what degree was post-project follow-up and technical support included in design?

Implementation

- What are the key ingredients for a successful project or sustainable operation of a water point?
- How significant are project requirements for guiding field actions and communication with beneficiaries?
- What are the reasons for failure of rural water projects?

2. Project Achievements

The Community Water Supply and Sanitation Project (Cr 2242-CE)

2.1 The Community Water Supply and Sanitation project was a high-priority operation for the government. It was integral to the government's strategy to provide infrastructure support to the southern parts of the county (the districts of Badulla, Matara, and Ratnapura) where the lack of services and unemployment had become more severe in than elsewhere, and lack of investment,

strained available water system resources. As its name implies, the project promoted self-help, self-reliance, and sustainable water and sanitation (W&S) strategies. The project's strategy was to increase beneficiary involvement (including that of women) through the use of existing local groups and, where there were no functional groups, to promote new, community-based organizations (referred to hereafter as water committees or local water users' groups) to take charge of the development, implementation, operation, and maintenance of new water supply and sanitation facilities.

2.2 Experience from other Bank-financed rural water projects (in Pakistan, Paraguay, Mali, and India, *inter alia*) demonstrated that a *community-based* approach responding to the expressed needs of the beneficiaries could be both effective and efficient. The Bank played a major role[4] in introducing this approach to Sri Lanka (on a large scale). Furthermore, the project initiated the concept of a consumer contribution toward the capital costs, either through cash or in-kind (labor or material) contributions. Promotion activities (for raising the contribution) were expected, first, to increase public awareness of the project and its goals then, later, to generate a heightened sense of ownership within the community that would enhance the sustainability of the new facilities.

Objectives

2.3 The project objectives centered on the following:

(a) development of systems and institutions for community-based planning, implementation, operation, and maintenance of cost-effective and sustainable water supply and sanitation;

(b) implementation of community-based schemes in rural areas and smaller towns of Badulla, Matara, and Ratnapura districts;

(c) preparation of a follow-up project that would apply the community-based approach, to be developed and tested during this project, to complete the coverage in the above districts, and to extend this approach to the rest of the country.

2.4 In 1988, the official rural water policy set specific service coverage targets.[5] Targets were identified and prioritized through DDPs (and related investment plans), which set standards and sub-project appraisal criteria. The DDPs for the three project districts were prepared before the project was approved. They set the water service coverage targets at 100 percent by the year 2000 and provided a detailed investment program for the first half of the 10-year strategic investment plan.

Project Components

2.5 The project had the following major components:

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4. Through the (1988) Rural Water Supply and Sanitation Sector Study. Also, later, through support for the District Development Plans developed in the three project districts.

5. In this chapter, coverage within the service areas of the schemes (villages) surveyed is defined as the percentage of households having service from a safe (previous) water source or the percentage of households having service from the new scheme.

(a) *Program development.* Publicizing the project, assessing partner organizations (NGOs), registering local water users' groups, and project planning and management. A Community Water and Sanitation Program Unit (CWSPU) was established in the Ministry of Housing and Construction to implement this component with branch offices in each of the three project districts, and technical assistance for these units.

(b) *Water supply.* Using a variety of designs (the specific scheme design was selected by each local water users' group), the project is expected to provide potable water to approximately 650,000 people in up to 2,700 villages and 17 small towns. Supply of safe water comes from protected wells (about 25 percent), spring-source gravity schemes (about 20 percent), and pumped supplies (about 13 percent). Communities usually base their choice of technology on the local hydrological and hydrogeological situation, and an analysis of the cost effectiveness of several scheme designs.

(c) *Sanitation.* The project provides funds to improve sanitation facilities through grants to eligible local water groups based on proposals from NGOs and the local groups. The grants are used to establish revolving funds that provide loans to villagers who wish to construct latrines. Experience has shown that about 80 percent of villages apply for latrine loans. Some villages that already enjoy adequate water supply coverage have also become involved with the sanitation component. When implementation is finished, the project is expected to have financed improved sanitation for about 3,800 villages plus 17 small towns in the three project areas, provided latrines for the 224 rural schools that currently lack them, and upgraded existing latrines in about half of the remaining rural schools and preschools that could benefit from improved sanitation.[6]

(d) *Hygiene education.* Expected health benefits from the project (as always) depend heavily upon a successful program of hygiene education and promotion of improved sanitation practices. *Inter alia*, the hygiene education program provides for Ministry of Health media campaigns on health and sanitation-related issues; and training in hygiene for MOH staff, school teachers, NGOs, local water groups and NGO members, community leaders, and volunteer workers in all project communities.

Project Rules

2.6 In almost all countries that use a community-based approach to the supply of water, 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. In rural areas,[7] community-based systems are invariably characterized by the active participation of

6. The study focuses mainly on the achievements of the water supply components and their impacts. It is, however, recognized that achievements under of the sanitation component and hygiene education are substantial, and important contributing factors to health improvements.

7. Community-based systems are also becoming common in peri-urban areas.

beneficiaries in system administration and direct local responsibility for all or certain aspects of O&M.

2.7 The key rules[8] for project eligibility, management, and O&M of the schemes under this project are as follows:

1. For each scheme, the local water users' groups were to: (i) cause consumers to collectively contribute at least 20 percent of the direct capital costs;[9] (ii) persuade consumers to assume responsibility for O&M on completion of the scheme; and (iii) levy tariffs to cover routine O&M costs and debt service.

2. For sanitation, the local water users' groups were to cause consumers to pay 100 percent of the cost to build or upgrade latrines, although they were given the opportunity to borrow 50 percent of their cost from the group's revolving fund.

3. In addition to the above, district councils and 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.

4. 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.

Achievements

2.8 In evaluating the achievements of the project, it is important to take into account that the project was only about 80 percent through its implementation cycle at the time of the survey. Also, it is worth bearing in mind that, among the three project districts, Matara has traditionally had the best health indicators. Even before the project, statistics for some villages were better than the national averages. In contrast, the health indicators for the rural areas of Badulla and Ratnapura show a standard of health that is below the national average in most respects—most notable is the districts' infant mortality rate, which is approximately 40 percent higher than the national average.

2.9 Table 2.1 lists the 18 randomly selected villages (nine in each district surveyed), the date each scheme was commissioned and the period of operation since commissioning. Also listed is the date when the scheme was handed over to the village local water users' group for O&M. Six schemes had not yet been handed over at the time of the study visits, and others had been with the groups only a short time. The range in operation times of the surveyed schemes is between 14 months and 44 months, and the average operational experience was 25 months. Although this operational experience is already substantial in technical terms, the actual O&M responsibility of the respective local water users' groups is in some cases shorter. The maximum is 33 months (Erapola in Ratnapura), and apart from the six schemes not yet handed over, three more schemes had been operated for only a couple of months by users' groups at the time of the survey.

8. During project preparation, consumer surveys were conducted, and pilot schemes 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.

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

Table 2.1. Status of the Randomly Selected Schemes

Village	Date of Commissioning	Date of Handover	Months In Operation Since Commissioning (as of study visit in December 1997)
Matara			
Beddewathugoda	May 1994	Handed over[1]	44
Dewalegama	April 1995	Not yet handed over	33
Ginnaliya	August 1995	Handed over[1]	29
Heegoda	September 1996	Not yet handed over	16
Kamburupitiya	December 1994	October 1997	37
Kongala Central	May 1995	September 1996	32
Radawela East	August 1995	Not yet handed over	29
Udukawa South	June 1995	November 1997	31
Usamalagoda	November 1996	May 1997	14
Ratnapura			
Dambawinna	November 1996	Not yet handed over	14
Delgoda East	April 1996	October 1996	21
Erapola	March 1995	April 1995	34
Gallella	November 1995	February 1996	26
Mahagama West	July 1996	Not yet handed over	18
Meddegama	November 1996	November 1997	14
Passaramulla		Not yet handed over[2].	
Thapassarakanda	November 1996	November 1996	14
Udagama	February 1996	March 1996	23

[1]Date unknown.
[2]Only one scheme was fully commissioned by November 1997. In the others, some work remained to be completed.

Coverage Improvements

2.10 This first five-year investment program has taken coverage close enough to the final target that it can be achieved within the next few years, given the current levels of activity. In Matara District, the survey found that the coverage in the surveyed villages improved from the pre-project range of 3 to 34 percent to 50 to 84 percent after scheme completion. In Ratnapura, the improvement was even more dramatic as the coverage rose from the pre-project range of 1 to 22 percent to a range of 62 to 98 percent. On average (unweighted mean values), coverage is now 74 percent having increased by nearly 60 percent. Both districts enjoy a relatively high standard of service because consumers gave preference to house connections and yard taps in most of the schemes, especially in Ratnapura. Most schemes have a small number of public standposts as well, and some villages have pockets served by wells (either shallow or tube wells) with handpumps.

Pre- and Post-project Access

2.11 Access to a potable water service can be measured by (i) the distance traveled to collect water and (ii) the time spent daily in this activity. Before the project, the distances each household traveled for hauling water were rather long. On average, questionnaire respondents reported that it was nearly 130 meters to traditional (or unimproved) sources—such as rivers— and 90 meters to safe sources. Over 1.5 hours were spent (on hauling water) per day during the wet season and over

two hours per day during the dry season. The survey found that the average distance traveled to collect water from the improved facilities after they were commissioned by the project dropped to 30 meters—some 70 percent of consumers are less than 30 meters from a water point in Matara; the corresponding figure for Ratnapura is about 80 percent. This translates into a reduction in distance traveled of about 60 meters and 120 meters, respectively. Consumers in Matara now spend some 45 minutes daily on collecting water, an average time saving of nearly 40 minutes. The corresponding figures for Ratnapura are about 30 minutes' collection time and over 60 minutes of water hauling avoided. This type of progress has not been taking place outside the project areas. The survey found that in the control villages (no project investment) the distance traveled to a water point within water schemes without systematic improvements is still over 120 meters.

2.12 For reasons that are not clear, men are becoming increasingly involved in hauling water for family use. While the water collectors are still predominantly women, the ratio between men and women has changed significantly from 1 man to each 6.5 women before the project to 1 to 4.5 at the time of the survey. Possible explanations include an increase in the availability of paid labor for women in the area, the increased use of mechanization in agriculture is freeing up men's time, the gender-specific division of labor is shifting, or the area is seeing the beginning of improvements in the status of women. The impact of the access improvements is discussed in Chapter 3.

Functioning of Schemes

2.13 Before the project, existing schemes—even the improved ones—did not produce water of acceptable quality (color, turbidity, etc.) 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, however, the responsible body expressed satisfaction with the design as implemented. The consumer survey found that over 70 percent of consumers said that the reliability of water service improved year-round as a result of the project (an additional 10 percent said that reliability had only improved in the wet season). There is a considerable difference between the two districts, however. While in Matara all consumers perceive that the service is capable of providing enough water (quantity) for year-round needs, such confidence did not exist in Ratnapura. There, some 60 percent of the consumers were of the opinion that the system provides enough water in the wet season but less than 30 percent considered the supply situation adequate to their needs during the dry season. This is a likely indicator that source development in the district has been suboptimal—a conclusion supported by the study finding on service hours (discussed below).

2.14 The water committee survey (undertaken in the selected villages) found that in Matara about 80 percent of the schemes have no leakages in their water mains, and all the schemes operate leakage-free standposts. The corresponding figures for Ratnapura are around 60 percent for both mains and standposts. The quality of water has clearly improved. Some 90 percent of the local groups report that water is of good quality as to color and turbidity. On the other hand, over 80 percent of the users' groups report that arrangements for quality control are less than adequate.

2.15 As to hours of service, about 80 percent of consumers indicated that they have 24-hour service during the wet season, but only 42 percent said that they enjoy around-the-clock service during the dry season. In Matara, the consumers' average reported service hours came to about 22 hours a day during the wet season and 20 hours a day during the dry season. Figures are somewhat lower for Ratnapura: consumers there reported that they had about 20 hours of service a day in the wet season but only some 11 hours daily in the dry season.

2.16 In hilly areas, especially at periods of peak use, it is often difficult to provide good service to the households on the hilltops. The survey indicates that in Matara nearly 80 percent of the schemes experience some sort of service interruptions or problems at critical points of the systems, while in Ratnapura there seems to be no evidence of such problems. The severity of these problems varies but most often it means shorter service hours than overall system averages for selected customers (as well as lower pressure, which is not a critical problem as showers and other pressure-sensitive, water-consuming appliances are not widely used).

2.17 Understandably, since the systems are new, the local groups report that repairs are required quite infrequently—when a system does break down, however, problem identification to full service resumption almost never takes more than 24 hours. This is a clear illustration of the success the project has achieved in creating a sound O&M management capacity among the local groups, the effectiveness of the respective skills training, and an impact of having an adequate spare parts supply in place.

Cost of Water Service

2.18 The water supply costs vary according to the complexity of the infrastructure constructed.[10] Most schemes in Ratnapura are gravity schemes that involve relatively high investment costs—there are no handpump well schemes (usually the cheapest system components) in the district. Schemes in Matara are typically combinations of various system types (gravity fed, handpump wells, tube wells with power pumps, and spring boxes). Overall, per capita costs ranged from about US$21 for a handpump well scheme in a Matara village to about US$57 for a gravity scheme in a Ratnapura village. The per capita cost among the gravity schemes ranges between US$38 and US$57 per capita depending chiefly on the complexity of the headworks and the length of the transmission line from the source to the village. Combination systems that mix technology choices range from US$22 up to US$55 (estimated average), depending on their proportion of handpump wells. These per capita investment costs are reasonable when compared with global cost data. The level of capital costs also varied depending on local construction conditions (Table 2.2).

10. The most expensive system cost Rs.2,993,130, and the least expensive system cost Rs.466,580 (US$48,590 and US$7,570 respectively at January 1998 exchange rate of Rs.61.6 = 1US$).

Table 2.2. Scheme Components, Costs, and Community Contributions

Location	Type of System				Cost				
	Gravity	Shallow Wells	Tube Wells	Spring Box & Pipe	Total Cost[a]	Project Contribution (%)	Community Contribution (%)[b]	Cost Per Capita, Rs	Cost Per Capita, US$[c]
Matara									
Beddewathugoda		1			834,100	86.7	13.3	1303.3	21.2
Dewalegama West	1	1		1	575,542	81.2	18.8	1635.1	26.5
Ginnaliya North	1	1	1		477,030	88.7	11.3	3407.4	55.3
Heegoda	1	1	1		958,838	79.1	20.9	1898.7	30.8
Karaputugala	1	1			698,400	81.9	18.1	1358.8	22.1
Kongala Central		1	1		1,373,346	86.5	13.5	1778.9	28.9
Radawela East	1	1			1,071,297	77.4	22.6	2732.9	44.4
Udukawa		1	1	1	466,580	85.7	14.3	1858.9	30.2
Usmalagoda	1				2,993,130	80.2	19.8	2423.6	39.3
Ratnapura									
Dambawinna	1				2,641,915	73.0	27.0	3471.6	56.4
Delgoda East	1				1,995,054	88.2	11.8	2352.7	38.2
Erapola	1	1		1	952,445	75.0	25.0	1368.5	22.2
Gallela	1				2,961,895	71.0	29.0	2961.9	48.1
Mahagama West	1				2,955,606	76.1	23.9	3003.7	48.8
Maddegama	1				1,691,875	76.9	23.1	2724.4	44.2
Passaramula	1			1	2,632,440	77.5	22.5	3538.2	57.4
Thapassarakanda	1				2,810,740	86.4	13.6	2626.9	42.6
Udagama	1				1,834,112	76.8	23.2	2342.4	38.0

Notes: a. Total costs: Construction and overhead. Overhead is 33% of total cost on average.
b. Community contribution is mainly unskilled labor.
c. US$ 1=61.6 Rs as of January 1998.

Community Contributions

2.19 The survey found that it is still traditional for consumers to contribute financially and in kind for improvements in their water supply systems. The 20 percent minimum requirement (see project rule number 1, *para. 2.7*) for community contribution was exceeded by numerous villages in both districts. In Matara, 33 percent of the community groups contributed over 20 percent of the capital costs of the new schemes; in Ratnapura, 78 percent of the villages exceeded the required contribution of 20 percent, the highest contribution being 29 percent. However, even the villages that contributed less than the required 20 percent made a substantial contribution—most in the range of 13 to 18 percent. The findings on contributions confirm the success of NGOs in creating strong and functional local water users' groups in the project villages. It can be assumed that this progress will continue in the villages just beginning to work with the project, when they gain more operational experience. The lowest contribution in a Matara village was about 11 percent. This was in one of the first villages organized, but no relationship between sequence and contribution could be established. Interestingly, however, the villages that contributed least showed below-average performance on the full range of social and organizational capacity indicators developed during the study.

Tariffs and Cost Recovery

2.20 In the past, it was common in the villages surveyed for regular beneficiary payments to cover about 30 percent of the ongoing O&M costs. The study found that in about half of the schemes in Matara the tariff level is Rs.5 to Rs.7 per month for the simple gravity and shallow well schemes; and tariffs vary from Rs.10 to Rs.20 (in only one case) per month in the rest: more

complex gravity or tube well schemes. Usually in combination schemes, the fee for families with house connections and yard taps is higher, from Rs.10 to Rs.15 per month. In Ratnapura fees tend to be higher: only some 30 percent of the schemes have the low tariff of Rs.5 per month; the majority of schemes have a tariff over Rs.10 per month. The tariff for house connections and yard taps is commonly Rs.20 per month. In both districts the fees paid are made up of two components; a membership fee and a service charge (or tariff).

2.21 The project rules require the village water committees or local water users' groups to set tariffs at level that permit the full recovery of O&M costs. During field visits, the study team briefly focused its inquiry on tariffs. Few villages have the data at hand that would enable them to calculate cost recovery data at this stage. Table 2.3 presents the current tariff levels in the seven villages (three in Matara and four in Ratnapura) where the study team was able to gather this information, and Table 2.4 presents key financial indicators in the same villages.

Table 2.3. Monthly Household Tariff (in Rs.) in Selected Villages

	Matara District			Ratnapura District			
Village	Kongala	Radawel	Usamalagod	Erapola	Gallella	Thapassarakan	Udagama
Standpost	7	10		3			5
Yard tap			10	5		25	5
H. Connection			10	5	20	25	
Dug well	5	10		5			

Note: A monthly membership fee is included in most of the above tariffs.

Table 2.4. Financial Indicators (1996–97) of Selected Villages, Rs.

	Matara District			Ratnapura District			
Village	Kongala	Radawela	Usamalagoda	Erapola	Gallella	Thapassarakanda[b]	Udagama
Tariff Collected[a]	402	3080	27890	240	36000	705	3872
Connection Fee[a]			17500	1202		2510	12100
Interest	790	950		831	3456	1400	50
Total revenue	1192	4030	45390	2273	39456	4615	16022
Expenditure	1240	1761	52178	3068	28024	15868	11965
Revenue/Expenditure Ratio	0.96	2.29	0.87	0.74	1.41	0.29	1.34
Collection, % of billing	6	15	46	5	90	20	47
Water users current with payment, %	10	15	50	20	90	N/A.	50

Notes: a. The connection revenue is included in tariff collected in Kongala, Radawela and Gallella.
b. Only membership fee is collected.

2.22 In three of the seven villages, the total revenue collected exceeded the O&M expenditure for 1996–97, in three more villages revenues are equal to the current expenditure level or more than 75 percent of it, and the remaining village has just reached the 30 percent level. The best performers are Radawela in Matara and Gallella and Udagama in Ratnapura where it is possible, given their past performance, that these villages will be able to cover (at least partially) major repairs and equipment replacement, and perhaps even a future system expansion (in addition to O&M costs). Gallella also has the highest *tariff collection ratio* at 90 percent. These financially better-performing villages also show strong ratings on almost all the social and organizational capacity indicators identified by the study (see *paras. 2.28 and 4.11*).

Collection Ratio

2.23 In Matara, only half of the schemes surveyed said that some water bill collection is carried out by local water groups. Where billing is taking place, the collection ratio is poor. More

than half of the villages that bill collect only 10 to 15 percent of their billing. The remainder, unfortunately a minority, do better: collection ratios range from 50 to 100 percent. If the villagers that were not surveyed follow the same pattern—which they should, village selection having been random—half of the Matara schemes have no water bill collection at all, and project staff need to pay more attention to regular collection of dues.

2.24 In Ratnapura, the local water users' groups seem to be more active in conducting the business aspects of water scheme management. Nearly 70 percent of groups in Ratnapura bill and collect water charges: their collection ratio varies between 20-90 percent of billing. The villages that have a good record in collecting water charges score high in social and institutional activity indicators (see *paras. 2.22 and 4.11*).

2.25 In those schemes where local water users' groups do not collect anything at the moment, either the need for repairs has not yet come up (the schemes are quite new and the group may have taken over the O&M responsibility only recently), or funds for repairs are collected as and when the need arises. In the case of handpump schemes, users often carry out, and pay for, minor repairs themselves without any involvement of the local water users' group. In some cases, where part of the scheme only serves a few households—such as a group of households being served by a tube well and house connections—the villagers have adopted the practice of collecting funds to cover the electricity bill, independently from the local water group operations.

Institutional Performance

Performance of Water Committees and Users' Groups

2.26 All communities surveyed have a community-based group that manages the new scheme(s). The group consists of the households using the scheme. Further, each of the local groups has an executive committee, a governing body that coordinates and implements all scheme-related activities. Members of these committees are chosen through elections in each community.

2.27 The users' groups—in particular their executive committees—are responsible for crafting rules that ensure participation of users in design and construction and govern the usage, operation, and maintenance of schemes among households. For example, the project rules require that these local groups set and collect charges to cover the operation and maintenance of new schemes.

2.28 Table 2.5 contains indicators developed to measure group performance during the design and construction as well as the O&M phases.

Table 2.5. Indicators of Local Group Performance

Design and Construction:	
Design participation (% of households)	90.1
Women's participation (% of households)	31.3
Construction participation (% of households)	50.5
Construction monitoring (% of households)	79.2
Construction sanctions (% of households)	36.1
Operation and Maintenance:	
O&M participation (% of households)	50.5
O&M monitoring (% of households)	91.7
O&M sanctions (% of households)	20.1
O&M dispute resolution (% of households)	50.5
Good water group (index)[a]	7.84
Female water committee members (% of water committee members)	40.9
Good water committee attendance (% of water committees that have more than half of members attend meetings)	55.6

Source: study questionnaire

a An additive index based on percentage of households that rated the functioning of the water group "good" or better.

2.29 In many communities, the users' groups managed to craft rules that ensured the participation of households in the design and selection of schemes. About 90 percent of households using the new schemes participated in their design and selection (Table 2.5). For about 31 percent of households, women—the primary water collectors—participated in the design and selection process and reported satisfaction with the way the scheme had been designed and selected.

2.30 Household participation in the construction of new schemes, however, was substantially lower than participation in design. Only about half of households using the schemes contributed cash, labor, or materials to construction (Table 2.5). The high share of non-contributors may have been partly due to absence of sanctions against non-contributors in many communities: many local groups allowed non-contributing households to use the schemes without penalty. About 80 percent of households reported that the executive committee monitored whether each household contributed to construction as planned, but only 36 percent said that it imposed sanctions on households that did not contribute.

2.31 The operation and maintenance of the scheme is the responsibility of the local water group after the scheme has been handed over to the community. The executive committee organizes the O&M: hiring caretakers and collecting user fees to cover O&M expenses and assigning maintenance tasks to households.

2.32 As discussed in the previous section, low collection rates reflect partly the fact that some schemes have not yet been handed over to a community. They also reflect the fact that in many communities it is inconsequential whether a household pays its fees or not: they are permitted to use the scheme even if they do not pay. About 92 percent of households reported that the executive committee monitors whether households pay, but only about 20 percent of these households said that sanctions are imposed on those households that do not pay (Table 2.5).

2.33 Further, about 50 percent of households reported contributing labor to O&M. These households had either carried out routine O&M tasks or participated in some other less frequent maintenance tasks. Most households using the new schemes are satisfied with the functioning of the users' groups. About 69 percent of households rated their functioning as either good or excellent.

2.34 The project trained personnel in each local water users' group to take over the responsibility for scheme O&M. Staffing arrangements are still temporary in many of the local water groups. Some groups have selected a caretaker (or several of them) for training and generally the trained caretakers are performing their duties satisfactorily. Other duties of a local water group, such as collection of fees, are handled by members the executive committee, most often by the treasurer.

2.35 Examples in *para.* 2.22 above illustrate the level and status of financial management by some local groups in late 1997. Out of the seven groups, three are fully meeting their O&M costs and even accumulating a small reserve (see the revenue/expenditure ratio in Table 2.4), three more are almost there, and only one is still far away from the target. The collection ratios in these selected villages indicate that there is still much room for improvement; only one village is performing at the satisfactory level of 90 percent. The remaining surveyed villages could not provide adequate data to carry out a similar analysis of their operations, which is itself an indication that they are not yet ready to handle independently their O&M responsibilities. As the project proceeds to its completion by the end of 1998, it is imperative that these aspects get attention and that adequate technical assistance (in financial management, including financial projections and tariff design) be provided so that all local water users' groups can comfortably handle the O&M of the schemes. This should be the number-one job for the consolidation phase of the project.

Performance of Partner Organizations and Government

2.36 Government officials and partner organizations implemented the projects jointly with community members. During the design and construction of schemes, NGOs were responsible for helping to establish a functioning local water users' group in each community; ensuring that communities were consulted and able to make informed decisions about the type of scheme they wanted; and overseeing the quality of construction. They were also responsible for ensuring that local groups have adequate training in financial management as well as access to spare parts and tools to operate and maintain the schemes. Finally, they were to deliver hygiene and health education training to households.

2.37 Table 2.6 contains indicators developed to assess the performance of government officials and their partner organizations during the design and the operation and maintenance phases.

Table 2.6 Indicators of Partner Organization and Government Performance

Design and Construction:	
Early water committee (% of communities)	100
Technology choice (% of communities)	94.4
Service choice (% of communities)	94.4
Cost choice (% of communities)	88.9
Location choice (% of communities)	100
Design performance (index, see para. 2.39)	4.78
Quality construction (% of communities with good quality)	66.7
Construction defects (% of communities)	27.8
Operation and Maintenance:	
Administrative training (% of water groups)	83.3
Hygiene training (% of households)	43.1
Access to tools (% of service operators)	44.4
Access to spare parts (% of service operators)	44.4

Source: study questionnaire

2.38 The NGOs had helped communities to form water groups; all the communities surveyed had established such groups. As planned, all these groups were formed during the design phase, before construction of the W&S scheme. In all but one case the NGO had facilitated the formation of the group: 89 percent of these groups have legal recognition.

2.39 The NGOs had also successfully mobilized the communities to participate in the design of schemes. All communities surveyed had participated in the selection of the service site(s). About 94 percent of communities had also participated in the selection of the type of technology and the level of service, and in about 89 percent of communities the cost of the service had been one of the selection criteria—different levels of service had had different costs. A "design performance" (additive) index was constructed from these five choice variables to measure the degree to which partner organizations achieved their goals in ensuring community participation in design. The index suggests that the performance of the NGOs in this area was good: on a scale of 0 to 5, the value of the index is 4.78.[11]

2.40 However, the quality of construction of schemes varies across communities. About 67 percent of communities surveyed assessed the quality of the construction to be at least "good" (Table 2.6), while about 28 percent of communities reported serious defects in construction.

2.41 Finally, partner organizations have imparted administrative training to 83 percent of water groups and hygiene training to 43 percent of households surveyed. Access to tools and spare parts is a problem in more than half of the communities. Only about 44 percent of service operators have access to them (Table 2.6).

Sustainability

2.42 Interviews with users' groups (and the discussion above on cost recovery) reveal an acute need for a number of managerial improvements. These fall especially in the areas of financial viability, improved management information, and long-term planning including tariff design. Local water users' groups frequently cite the need to regularize the tariff system and the manner of collecting water bills. Training and skills upgrading are thus equally important to ensure the sustained operation of new facilities over the longer term. It is noteworthy that many villages do not have paid system operators. They function without paid employees in this area because (for cultural and religious reasons) volunteers take turns in handling routine maintenance and working on major repairs. This is particularly the case in the simple handpump well schemes. While the use of volunteers contributes to sustainability in several ways (promoting local ownership, maximizing on local leadership and community work traditions, to name a few), it also inhibits the further professionalization of operation, because volunteers tend to change too often to be trained effectively and, especially if they are respected elders, they may resist technical advice.

11. There were five yes/no questions used (yes=1, no=0).

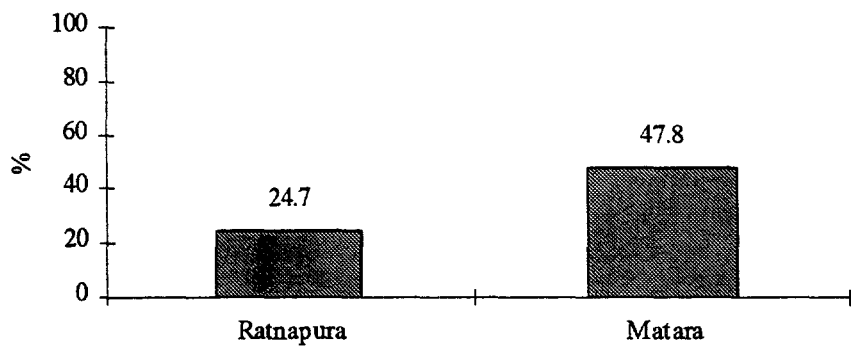
3. Project Impacts

Health Impacts

Self-reported Improvements in General Health

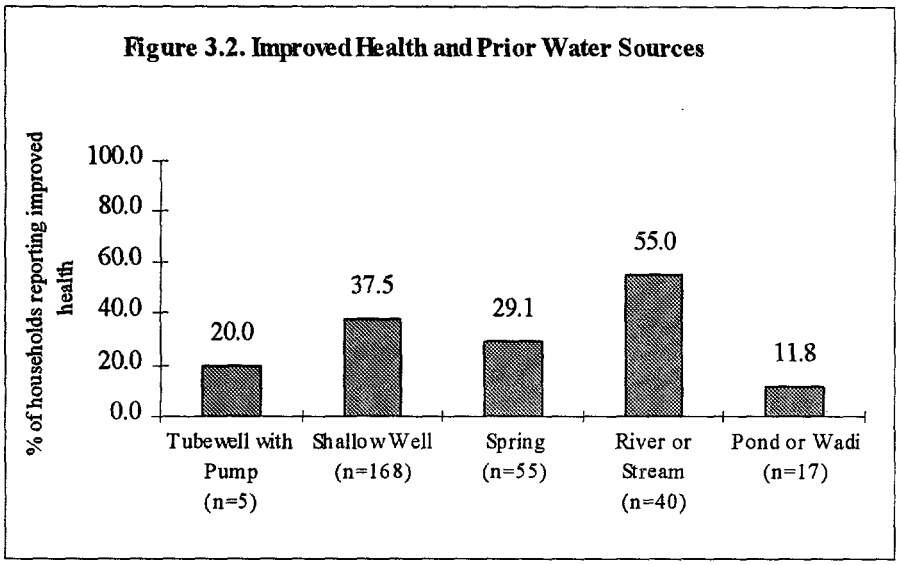
3.1 Nearly 400 rural households were interviewed concerning recent health problems. About 37 percent of households using project-financed water schemes reported that they thought their family's health had improved since the new water schemes began functioning. Health impacts, however, vary across the two districts studied (Figure 3.1). In Ratnapura, only about a quarter of the households using a new scheme reported health improvements, whereas in Matara nearly half reported improvements. Also, health impacts vary greatly across communities in both districts. In some communities only 4.5 percent of households surveyed believed new water schemes have enhanced their health status, while in other communities all households surveyed were confident that the schemes improved their health—a clear indicator that baseline conditions also varied considerably.

Figure 3.1. Share of Households Reporting Improved Health



Relationship of Pre- and Post-project Water Source to Health Improvement

3.2 Households whose previous source of water was either a river or a stream most frequently reported health improvements. More than half of the households that used water from a river or a stream before the project found that the new water scheme has had a positive impact on their health (Figure 3.2). Households that currently obtain water from shared piped connections most often said that their health has improved. More than half of these households reported positive changes in health.



3.3 The data in Figure 3.2 can be collapsed into three categories to distinguish those that have private piped connection from other groups. This reveals that the highest percentages of health improvement (55 and 39 percent) are for families that still share water service, indicating that health impacts were greatest for the poorest.

Health Statistics

3.4 At the time of the survey, 4 percent of households interviewed with the new water schemes had suffered from diarrhea in the previous two weeks. The incidence of diarrhea varied across the two districts: compared to 6 percent of households in Ratnapura, only 2 percent of households were infected in Matara (Table 3.1). Of the households with diarrhea, 73 percent in Ratnapura and 33 percent in Matara had sought medical treatment due to the illness. Further, in Ratnapura, the incidence of diarrhea was fairly concentrated: 36 percent of diarrhea cases came from the same community.

Table 3.1. Diarrhea: Incidence, Treatment Sought, and Mortality

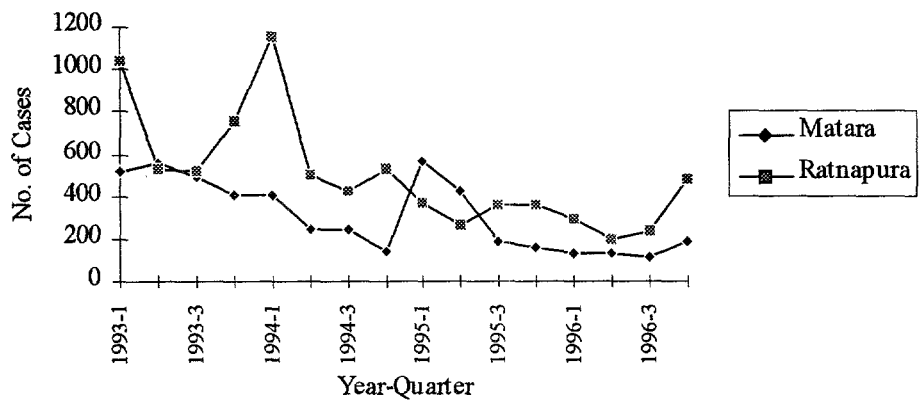
Among Service Users	Incidence of diarrhea in the past two weeks (% of households)	Sought medical treatment due to diarrhea in the past two weeks (% of households with diarrhea)	Hospitalization due to diarrhea in the past year (% of households)	Death in household due to diarrhea in the past year (% of households)
Ratnapura (n=176)	6.0	73.0	0	0
Matara (n=172)	2.0	33.0	1.9	0
Both districts (n=348)	4.0	64.0	0.9	0

Source: survey data

3.5 No one from the households interviewed had died as a result of diarrhea in the past year. Only 2 percent of households using the service in Matara said that a household member had been hospitalized because of diarrhea during the past year.

3.6 Hospital records for 1993–96 indicate that during that period the number of bacillary dysentery cases in hospitals in Ratnapura and Matara declined.[12] Bacillary dysentery is the most common water-borne disease and it is often the reason for water-related hospitalization in Sri Lanka. Figure 3.3 shows a declining trend in both districts for the number of bacillary dysentery patients in 1993–96.

Figure 3.3. Number of Bacillary Dysentry Cases in Ratnapura and Matara in 1993-96



Source: Quarterly reports from Matara and Ratnapura hospitals

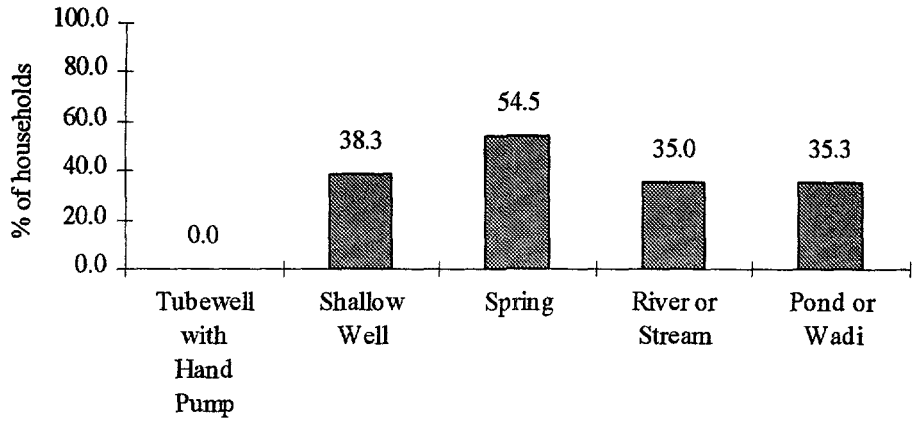
Health and Water Consumption Levels

3.7 About half of the households that reported improvement in their health had increased their consumption of water since the new water scheme started functioning. The quantity of water consumed per household and per capita is about the same in Ratnapura and in Matara. On average, a household using the service consumes 74 liters of water per day. The per capita consumption ranges from 9 to 34 liters, the average being 17 liters.

3.8 Households whose previous source of water was a spring have most often increased their water usage: about 55 percent of these households reported that they currently consume more water than they did before the project (Figure 3.4). This change reflects the reduced distance these households have to travel to collect water and the ease with which jugs can now be filled. Generally, households that are consuming more water now have experienced a larger reduction in the distance they have to travel to collect water. The distance (per trip) to collect water dropped by about 112 meters for those households that increased water consumption, while it dropped only by about 80 meters for the others.

12. At the time of the survey, data for 1997 were not yet available.

Figure 3.4. Increased Water Consumption and Prior Water Sources

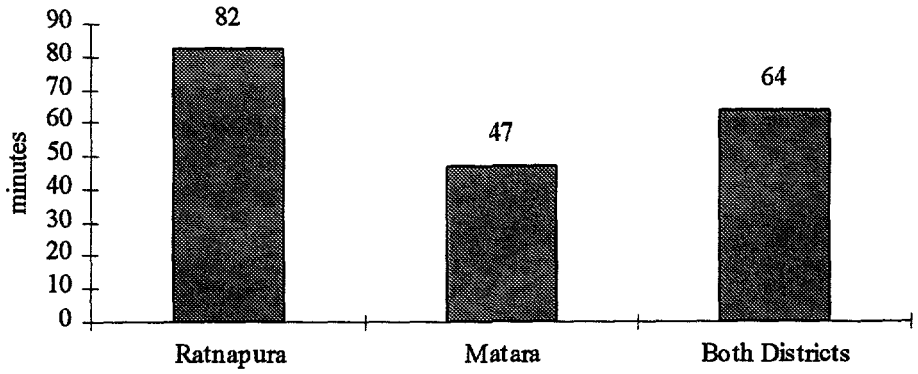


3.9 The awareness of safe sources of water and practices of water handling influence the health impact. When households using the water service were asked to classify different water sources as safe or unsafe, about 84 percent of them classified water from a river or a stream as safe for drinking. Further, about 89 percent of households that had obtained hygiene training as part of the project considered water from a river or stream as unsafe. Similarly, about 89 percent of households surveyed reported learning that they should purify unsafe water before drinking it.

Economic Impact

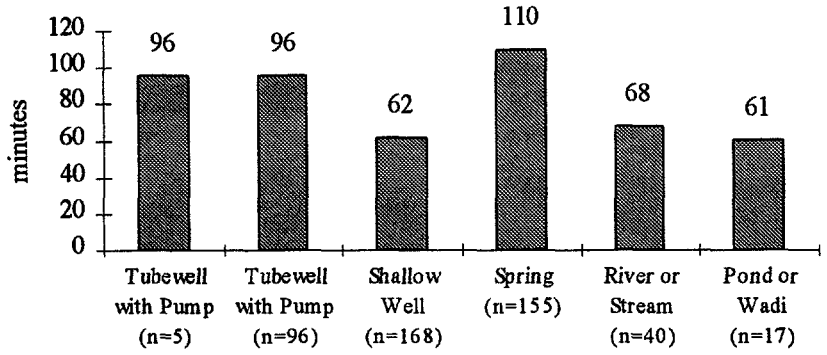
3.10 The main economic impact of the project has been time saved in water collection: the average time spent daily by a household collecting water has decreased by 64 minutes (Figure 3.5). In Ratnapura, the average time spent daily hauling water dropped by 82 minutes, while in Matara households have saved on average 47 minutes.

Figure 3. 5. Average Reduction in Time a Household Spends Daily Collecting Water



3.11 The average daily water collection time dropped the most for households whose previous source of water was a spring. Their time spent daily carrying water dropped on average by 110 minutes (Figure 3.6).

Figure 3.6. Average Timesaving in Water Collection and Prior Water Source



3.12 Also, not surprisingly, those households currently enjoying a house connection or a yard tap experienced the largest time savings, on average 87 minutes, versus 47 minutes for those with shared piped connections and 25 minutes for those with a shared source.

3.13 The benefits of these time savings have accrued primarily to women. The time saved per household in water collection adds up to more than three 10-hour working days per month on average, which has a minimum economic value of about Rs.280. Thus, for each household, the potential value of this project benefit is about 20 percent of the average monthly family income[13] (the average time saved daily is 64 minutes, the mean hourly wage rate for unskilled agricultural labor is Rs.8.4/hour).[14] If it is assumed that the potential economic benefit of the time savings is realized by the beneficiary families, it would mean an ERR of up to 20 percent in some of the sample villages (see Table 2.4); in all cases the ERR would be positive. Of course not all women choose (or are able) to obtain remunerated work with the time made available. Indeed many of those interviewed in focus groups said that the time saved has allowed them to spend more time with their children, take care of other household chores, and simply to relax a bit more.

3.14 The study did not collect data on prevailing medical charges, but clearly no discussion of the project's economic impact would be complete without mentioning forgone medical expenditures and the other costs of illness. Because of safe water, project beneficiaries avoided clinic and doctors' office visits, and prescription charges. In addition, forgone income because of lost work days (either because a parent was sick, or because care for a sick child precluded work) have been substantially reduced.

13. Based on four 40-hour weeks.

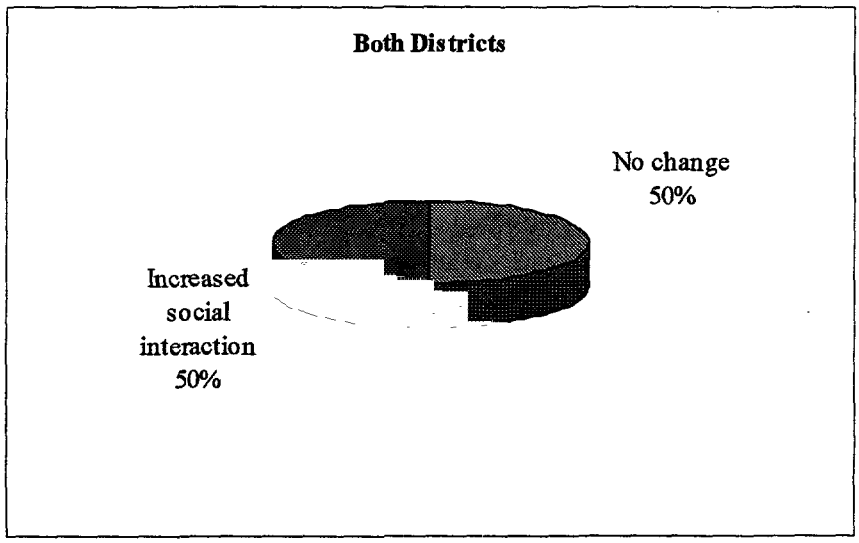
14. Agriculture, minimum rate obtained from the Staff Appraisal Report (1992) modified according to IMF indices for prices and labor.

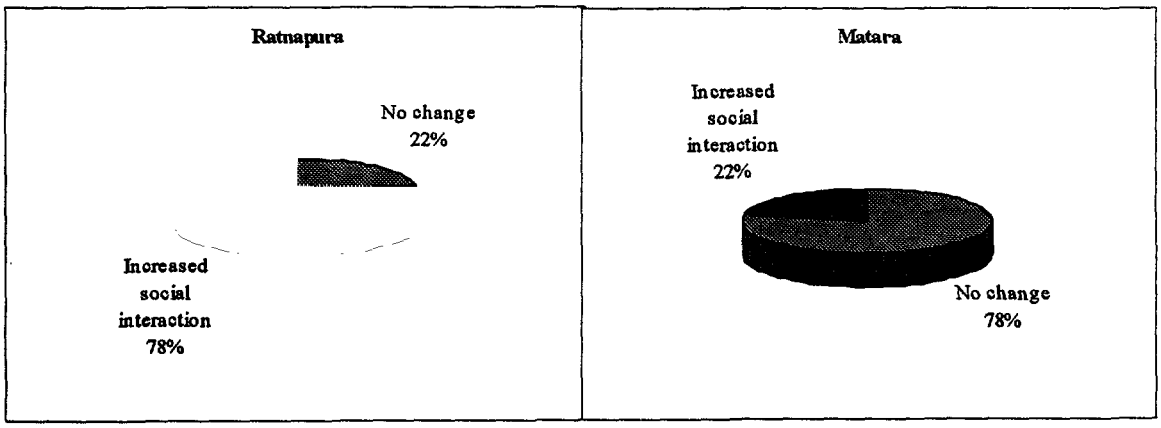
3.15 Only eight households using new water schemes said that they have started new income-generating activities that use water. Four of these households were in Ratnapura and four were in Matara. These activities included production of bricks and rubber sheets and cultivation of spices.

Social Impact

3.16 Half of the water committees interviewed reported that the project has increased social interaction in their community: more community activities have been organized since the project started. Community activities initiated include road development, construction of a preschool and community hall, and establishment of rural credit facilities. The perceptions of water committees in Ratnapura and Matara districts differ dramatically, however (Figure 3.7). While 78 percent of water committees in Ratnapura held that social interaction in their community had increased, only 22 percent of water committees in Matara said the same.

Fig 3.7. Changes in Social Interaction

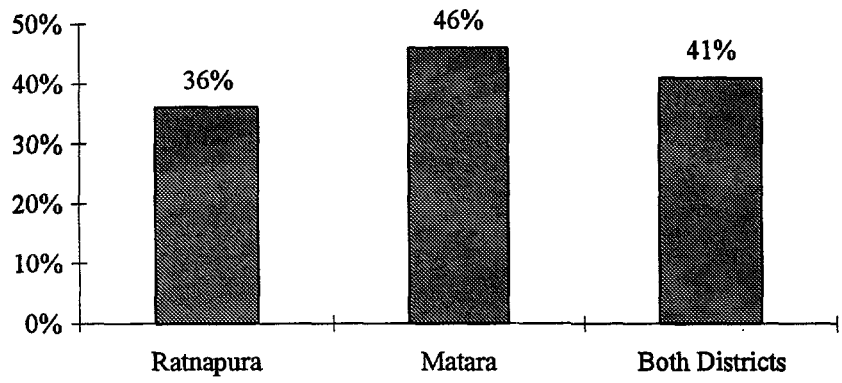




3.17 The project has also empowered women. On average, about 41 percent of members of executive committees of local water users' groups are female. In Ratnapura, the average share of

women in executive committees is about 36 percent, whereas in Matara about 46 percent of executive committee members are female (Figure 3.8). The difference between Ratnapura and Matara reflects the differential status of women as leaders in these districts. In Matara, in about one-third of communities surveyed at least half of community leaders are women, while in Ratnapura in only about 22 percent of communities is the majority of community leaders female.

Figure 3.8. Share of Female Members in Executive of Water Groups



Institutional Impact and Village-Level Institutions

3.18 The project has managed to develop systems and institutions for community-based planning, construction and O&M of W&S services. All 18 communities surveyed have a local water users' group.

3.19 The local water users' groups and their executive committees were the main village-level institutions created by the project. About 69 percent of households using water schemes rated the functioning of these institutions as either good or excellent. The delivery of W&S services was demand-responsive and community-based. As noted earlier (*paras. 2.36-38*) community members, through local water users' groups, participated in the design, selection, and construction of new schemes. About 90 percent of households surveyed participated in the design and selection of the scheme. Women participated in the design process in 40 percent of the households.

3.20 The O&M of the scheme is the responsibility of the local water users' group after the scheme has been handed over to the community. The executive committee of the local water users' group organizes the O&M. Despite poor collection rates, all communities so far have borne the O&M expenses themselves without external assistance. About 50 percent of households reported to have contributed labor to the O&M of the scheme. Also, the schemes are still fairly new and no major repairs have been needed. For discussion on the sustainability of service, see paragraph 2.42.

Environmental Impact

3.21 The environmental impacts of the project are difficult to quantify, but clear improvements have occurred. The project components include new water supply systems in rural communities, a range of sanitation solutions, and hygiene education. The water supply component contributed to reducing contamination of groundwater by improving and protecting water sources and promoting better latrines with water seal designs. The hygiene education and sanitation component had a positive environmental impact by reducing the health hazard of indiscriminate defecation in open areas and within family compounds. Although the project exploited surface and groundwater resources, the volumes removed were very small. The risk of local contamination of groundwater through concentrated underground disposal of excreta in latrines was supposed to be addressed by careful sitting of latrines relative to water points and new water supply sites. This study did not determine whether contamination of groundwater has been completely avoided, but no instances of degradation were reported.

4. Findings

4.1 Bank support for the rural water subsector in Sri Lanka has generally been relevant and is making a significant difference in the quality of village life. The rural water infrastructure is in place and functioning. Sanitary conditions have improved substantially. Moreover, the institutional development achievements are impressive. Although implementation is still under way, the various schemes are helping to reduce the deficit in rural water supply, and increasing water coverage. In some project-served villages, water service coverage was as low as 1 percent. In the best villages coverage has reached 98 percent, average water coverage being nearly 75 percent, and use of pour-flush latrines is common.[15] Two questions need to be asked, however. One, to what degree is this project community-based? And two, to the extent that the project is community-based, did this enhance or constrain the achievement of a positive outcome?

4.2 A community-based approach to W&S delivery calls for a joint effort by community members and government officials in the design and construction of the service, and private sector provision of goods and services. The data reviewed and the field research show that this project has indeed been a joint effort. Community members and government officials worked together to provide the service, and conditions on the ground turned out very much as planned. Government officials had incentives to bring community members into the design process and community members contributed inputs to the process as desired: the incentive structure facilitated efforts by stakeholders to participate and contribute.

4.3 The delivery of W&S services financed by the project was also supposed to be demand-responsive. Community members were supposed to have been given the opportunity to decide what kind of service they wanted, based on their budget constraints: 17 out of 18 communities surveyed had had the opportunity to choose the level of technology to be used, and to influence the location decisions regarding scheme infrastructure. And 100 percent expressed their satisfaction with the result of the design process.

15. The village technical data sheets show that in the 18 schemes surveyed, some 70 percent of the latrine demand (assumed on the basis of the number of households with poor latrines or no latrines at all) has been so far met; and the implementation of the sanitation component continues.

4.4 Another reason this project should be classed as community-based is that the rural villages paid part of the capital cost and it continues to be the plan that the villages are to pay all normal O&M and repair costs. Although the study found active participation in system administration and direct local responsibility for all or certain aspects of operation and maintenance, tariffs remain too low, as do collection rates. Serious efforts are warranted if the local groups are going to be left in a financial condition that will permit the sustainable operation of their system over the long term.

4.5 The project maximized health benefits by integrating water, sanitation, and hygiene education interventions, an approach typical of community-based projects. Health impacts have been concentrated on the poor. This was to be expected: even without the project the better-off are often able to find ways to get safe water into their homes. Community-based projects have a special focus on women as users, planners, operators, and managers of water schemes. While women's participation is not equal to that of men in all areas, the study has shown that women play a significant role in the local water users' groups, their involvement in water-related community affairs is greater than would normally be the case, and the status and lives of women are better than they were before the project.

4.6 Local water users' groups have been established in rural villages; their members and executive committees keep the schemes functioning and help to promote improved hygiene. Informal rules among water users about decision-making, household contributions to the service, monitoring of these contributions, sanctions against misconduct, and dispute-resolution mechanisms also had a positive influence.

4.7 Did all the benefits that accrued as a result of the project stem from the adoption of the community-based approach? Not entirely. The W&S schemes could not have succeeded without clean and reliable water sources, sound technical analysis, and readily available tools and spare parts provided by the project team. But the study also breaks new ground, showing that in the communities where project outcomes were best, social and organizational capacities were most developed. Stated differently, project outcomes varied according to the levels of available social capital.

4.8 What explains the varied performance and impacts of these community-based schemes? Why do schemes in some communities perform well and have substantial positive impacts? Why do schemes in other communities perform poorly and have limited impacts? This sub-section sill explore this question.

4.9 The community-based approach to W&S delivery calls for a joint effort by community members and government officials in the design and construction of the W&S scheme. Whether in practice these groups work together to provide the service as planned depends on incentives faced by these stakeholders to participate and contribute. Institutions—the formal and informal rules that govern the behavior of community members, government officials, and other stakeholders—in turn play a critical role in affecting these incentives. Three sets of institutional determinants influence the performance and impact of W&S projects by promoting information flows and limiting opportunistic behavior among stakeholders: social capital, governmental and NGO institutions, and service-level institutions. First, social capital refers to formal and informal rules about interactive and cooperation within communities. Second, governmental and NGO institutions refer to formal and informal rules that affect the incentives of government officials or representatives of NGOs. Third, service-level institutions refer to formal and informal rules among water users about the design, construction, and operation and maintenance of service.

4.10 In the analytical work conducted by IRIS, the communities surveyed were ranked by the study according to the performance of W&S services. The performance was measured by an index of indicators reflecting the service functioning. The means of selected indicators of social capital, governmental and NGO institutions, service-level institutions, performance, and impact were compared for communities with the best and worst performing W&S services defined by what is referred to as the functioning index. The means of all the indicators are higher for the communities with the best performing services.

4.11 Table 4.1 ranks communities surveyed according to functioning of the new scheme. The functioning of schemes was measured by a functioning index that is a composite index of the indicators of leakage, system failures, and water quality.[16]

Table 4.1. Indicators of Performance for the Six Best and Six Worst W&S Services in Sri Lanka

	Indicator	Mean
Best Performers:		
Social Capital Indicators:	Two community activities	0.72
	Putnam index	25.09
	Design performance	5.00
Indicators of Government Institutions:	Hygiene training	0.45
	Design participation	0.93
Indicators of Service-level Institutions:	Satisfactory women participation	0.35
	Construction participation (> 2 days)	0.94
	Construction monitoring	0.72
	O&M any payment	0.28
	Good water group	8.48
Performance Indicator:	Functioning index	9.74
Impact Indicator:	Improved health	0.49
Worst Performers:		
	Number of groups	3.18
Social Capital Indicators:	Putnam index	23.63
	Two community activities	0.37
	Design performance	4.67
Indicators of Government Institutions:	Hygiene training	0.38
	Design participation	0.87
Indicators of Service-level Institutions:	Satisfactory women participation	0.25
	Construction participation (> 2 days)	0.84
	Construction monitoring	0.74
	O&M any payment	0.32
	Good water group	6.76
Performance Indicator:	Functioning index	7.62
Impact Indicator:	Improved health	0.25

4.12 The study shows that in those communities where the pre-existing social capital (measured by association and civic activity) was high, as well as in the communities where social capital increased through participation in the project, the schemes are performing better. A larger share of communities with the best performing services had at least two community activities (72 percent) as compared to communities with the worst performing services (37 percent). These activities include construction of schools, roads, or religious buildings and maintenance of roads.

16. An additive 10 point index based equally on consumer satisfaction and lack of observed or reported technical problems. The absence of the following factors were each assigned a seventh share of 5 points: leakage in the network, leakage in the standpipes, frequent system failure, neglect of key repairs, excessive coloration, high turbidity, and service problems at critical areas. The remaining (maximum of) 5 points were awarded according to the percentage of households surveyed that expressed satisfaction with the technology choice they were given.

A comparison of the Putnam index[17] (25.09 compared to 23.63) reveals that households in communities with the best performing services belong to more groups, and that membership in these groups is also more heterogeneous regarding religion, occupation, and gender (see Annex 1). Further, as the table indicates, the study found that household participation in design and construction was higher in communities where schemes have performed best than in communities with the worst performing schemes. In communities in the best category 93 percent of households had participated in the design and 94 percent contributed at least two days of labor to construction compared to 87 and 84 percent in the worst category. Households also rate the functioning of the water committee higher in communities with the best performing schemes than in the worst performing ones. A "good water group" index reflects the average household assessment of the functioning and effectiveness of the water groups. The value of the index is higher in communities in the best performer category (8.48) than in the worst performer one (6.76), showing that users confirm the study's categorization.[18]

4.13 Finally, communities with the best performing schemes have experienced a stronger impact on health than communities with the worst performing ones. Almost half of the households in communities with the best performing schemes and a quarter of the households in communities with the worst performing ones reported that their family's health had improved since the new scheme started functioning.

5. Policy Conclusions and Recommendations

Conclusions

5.1 The analysis of the field survey results yields several interesting policy conclusions:

- *Involve women in the design and management of the W&S service.* The results of this study 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 W&S service matches their needs and performs well.[19]

17. The Putnam index is an index of social capital that is the product of the number of groups a household is a member of and the characteristics of the group. Unlike the the results with two community activities, the difference between the means of this measure of social capital is not statistically significant.

18. The relationships between social capital and the functioning of village-managed water supply schemes will be explored further in a subsequent paper that integrates data from a number of rural water projects around the world.

19. These results complement the results obtained by Sara and Katz (see below). They showed that demand-responsive community-based W&S services are likely to have sustainable impacts on poverty alleviation and that sustainability of services was markedly higher in communities where households had made informed choices about whether to build a water system and about the type and level of service. [Sara, Jennifer and Travis Katz (1998). *Making Rural Water Supply Sustainable: Report on the Impact of Project Rules.* UNDP-World Bank Water and Sanitation Program].

- *Community-based W&S services are likely to perform better and have stronger impacts in communities with high levels of social capital.*[20] Project designers need to pay close attention to existing levels of social capital in communities, and adjust the approach to service delivery accordingly. The existence of social networks improves group organization and service functioning, 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. Therefore, in the design of projects that finance community-based W&S services—and in particular in the design of social mobilization efforts—the existing levels of social capital in communities needs to be taken into account. In communities with low level 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.

- *Rules need to be clear, well understood, and accepted by all stakeholders.* The study findings on social capital highlights the importance of those rules that govern the use, operation, and maintenance of W&S services by the water users. Of course, the effectiveness of water committees influences the performance of the W&S service: they provide users with incentives to contribute the required inputs to the design, construction, and O&M of W&S services. And they develop rules. Whether these rules exist in the first place—and whether they are properly implemented and enforced—depends on the social mobilization efforts of the project implementers. For example, whether women participate in service design and management, whether households contribute to construction and pay for water (as agreed), depends partly on the project rules.

Recommendations

5.2 The findings and conclusions of the study leads to the following recommendations for future project preparation and design:[21]

- The project implementers 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. Government and NGO participation is also governed by project rules. Whether they carry out their tasks as planned and provide accurate and helpful information to community members about technology and service options, and to teach community members about better hygiene practices, critically affects the delivery of decentralized W&S services.

- **Project design should respond to village aspirations for high service standards.** In the past few years, aspirations have steadily risen, even in very poor countries. Local people have little incentive to participate actively if the service they are going

20. This extends the previous results on social capital obtained by Narayan and Pritchett (1997). They found that villages in Tanzania with high levels of social capital have better public services and more communal road construction and maintenance activities than villages with low social capital.

21. The project unit reports that a large-scale follow-on project is under preparation, and the Bank has been approached to fund it.

to be provided with does not meet their aspirations. There is also a financial justification for aiming high. The amounts of money that can be collected from the use of very simple systems (after paying personnel costs) rarely cover even ongoing O&M, much less full cost recovery (as shown in Table 2.4). 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 make the continuing existence of a local water committee worthwhile.

- **Design for full coverage and equitable distribution.** Many systems have difficulty providing adequate service to critical areas such as hilltops. An extremely common pattern is that systems are designed for only the original number of users that express interest and pay their quota. Once the rest of the community sees that a system was really built, however, 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 surcharge for each system expansion.

- **Many unexpected social factors are related to good cost recovery.** Factors such as participation in multiple community activities by user group members, participation in system design, participation in system construction, 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.

- **Pay close attention to existing levels of social capital in target communities.** Adjusting the approach to service delivery according to existing levels of social capital should prove beneficial. Community-based W&S services are likely to perform better and have stronger impacts in communities with high levels of social capital. The existence of social networks improves group organization and service functioning, and success in any endeavor which benefits the community leaves a village better able to meet the next challenge. In communities with low levels of social capital, special efforts may be needed to ensure that local organizations succeed in a few activities before commencing something as challenging as a water scheme; the type of social mobilization efforts that will be conducted should be considered carefully and piloted during the design phase.

Annex 1

Social Capital Table

Most (91 percent) households surveyed are members of at least one community group (farmers' group, women's group, credit/finance group, political group, youth group, religious group, or a death donation society). On average, a household is a member of 2.4 groups. These groups are fairly heterogeneous regarding religion, gender, and occupation of their members, and their decision-making is participatory. The Putnam index measures both the quantity and quality of associational activity: it measures both the quantity of community groups an average household belongs to and characteristics of these groups. The value of the index varies across communities between 15.9 and 39; the average is 25.4. These high index values indicate fairly high levels of social capital in communities surveyed.

Of the households surveyed, 75 percent reported that at least one community activity had taken place in the past year; 46 percent reported at least two such activities. These activities include building schools, constructing or maintaining roads, or constructing religious buildings. About 72 percent of households participated in at least one activity. Finally, all water users' groups reported that households in their community cooperate and interact frequently.

Table of Performance Indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13
Ratnapura													
Dambawinna	3.40	26.25	0.45	3.00	0.15	0.78	0.35	0.94	0.78	0.11	8.17	7.70	0.05
Delgoda	2.96	23.30	0.09	5.00	0.65	0.95	0.35	0.86	1.00	0.50	8.10	8.29	0.04
Erapola	4.86	39.05	0.76	5.00	0.67	0.95	0.43	1.00	0.95	0.89	9.21	8.74	0.24
Gallela	4.05	26.33	0.19	5.00	0.24	0.89	0.43	0.95	0.95	1.00	6.29	8.03	0.29
Mahagama West	3.86	30.67	1.00	5.00	0.33	0.81	0.10	0.86	0.62	0.10	7.00	7.60	0.62
Meddegama	3.45	28.50	0.75	5.00	0.35	0.94	0.25	1.00	0.83	1.00	9.17	8.30	0.20
Passaramulla	3.20	24.50	0.95	5.00	0.40	0.94	0.30	0.94	0.33	0.00	10.43	9.60	0.30
Tapassarakanda	2.40	19.40	0.00	5.00	0.55	0.95	0.20	0.79	1.00	0.11	4.70	5.90	0.05
Udagama	3.88	29.83	0.38	3.00	0.21	0.86	0.29	0.95	0.95	0.95	13.69	8.35	0.29
Matara													
Beddaawathugoda	2.09	16.70	0.13	5.00	0.70	0.91	0.26	1.00	1.00	0.00	5.86	9.34	0.61
Kongala Central	4.10	30.30	1.00	5.00	0.50	1.00	0.35	1.00	0.94	0.44	4.92	10.00	0.50
Dewalegama	2.40	15.85	0.50	5.00	0.35	0.83	0.10	0.61	0.11	0.11	6.33	8.20	0.45
Ginnaliya North	2.75	20.45	0.65	5.00	0.35	0.89	0.55	0.95	0.95	0.63	5.43	9.00	0.25
Heegoda	3.80	26.95	0.60	5.00	0.20	0.89	0.35	0.94	0.82	0.00	7.58	9.10	0.10
Karaputugala North	3.48	28.62	0.71	5.00	0.48	0.95	0.43	1.00	1.00	0.32	7.29	9.46	0.52
Radawela East	4.10	33.67	0.95	5.00	0.52	1.00	0.53	1.00	0.84	0.89	16.26	10.03	0.90
Udukawa South	2.30	16.75	0.60	5.00	0.10	0.78	0.25	0.72	0.22	0.00	6.14	10.00	0.10
Usamalangoda	2.59	19.41	0.32	5.00	0.36	1.00	0.14	1.00	0.95	1.00	4.65	9.05	0.50

1 = Number of groups	8 = Construction participation (> 2 days)
2 = Putnam index	9 = Construction monitoring
3 = Two community activities	10 = O&M any payment
4 = Design performance	11 = Good water group
5 = Hygiene training	12 = Functioning index
6 = Design participation	13 = Improved health
7 = Satisfactory women participation	