

Report No. 17923

# Paraguay

## Impact Evaluation Report

### Community-based Rural Water Systems and the Development of Village Committees

Rural Water Supply Project (Loan 1502 PA), Rural Water Supply and Sanitation  
Project II-III (Loans 2014, and 3519 PA)

May 29, 1998

Operations Evaluation Department



## Currency Equivalents

Currency unit = Paraguayan Guaranies  
US\$1.00 = G.2,192.00

## Abbreviations and Acronyms

CORPOSANA	Corporation for Sanitary Works
CWSS	Community-based Water Supply and Sanitation
ERR	Economic Rate of Return
GNP	Gross National Product
G.	Guarani
IER	Impact Evaluation Report
NGO	Nongovernmental Organization
O&M	Operation and Maintenance
OED	Operations Evaluation Department
RWS	Rural Water Supply
SENASA	National Environmental Sanitation Service

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**MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT**

**SUBJECT: Impact Evaluation Report on Paraguay  
Community-based Rural Water Systems and the Development of Village Water  
Committees  
Rural Water Supply Project (Loan 1502-PA)  
Rural Water Supply and Sanitation Project II-III (Loans 2014 and 3519-PA)**

Attached is an impact evaluation report (IER) on three rural water supply (RWS) projects in Paraguay. In 1978, Paraguay RWS I was the first stand-alone RWS project financed by the Bank. Four RWS projects (most recently RWS IV, approved in 1997) have benefited from US\$80.8 million of Bank lending. The objective of this evaluation is to assess the impacts of the World Bank's assistance program on the performance of Paraguay's rural water subsector. The study used a participatory approach based on an evaluation workshop, key informant interviews, field visits, systematic data collection (including surveys of randomly selected key stakeholders), and beneficiary interviews.

The fundamental objective of the projects was to mitigate precarious living and health conditions in rural communities by providing safe water supply and sanitation facilities. The loans have financed the work of the National Environmental Sanitation Service (SENASA) with *juntas de saneamiento*, nonprofit committees legally constituted to manage water and sanitation within towns and villages of 400 to 4,000 inhabitants. Each Bank loan has followed the same community-based strategic approach, requiring that each participating village operate and maintain its water system. Successive loans have extended coverage to new communities and geographic regions.

Bank support for the rural water subsector in Paraguay has made a significant difference in the lives of rural families in a large geographic area. The three loans that have been implemented have led to the establishment of 275 functioning community-based water systems giving more than 400,000 people a safe water supply and raising the coverage of rural areas from around 1 percent to about 20 percent over a 20-year period. SENASA records show that more than 210,000 sanitary units have been constructed in rural areas, not all of which are in the project area or were built with Bank assistance. In addition, SENASA delivered 952 training courses on health and hygiene and on water system management. These have directly benefited approximately 160,000 individuals, not counting the impact of the education on their families and the juntas themselves.

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An OED review of Ministry of Health data for a 10-year period compared hospital visits for five villages that had received potable water through the project with five others that had not: deaths due to diarrhea were seven times higher in unserved villages. Similarly, a study of 150 villages found that over 95 percent of recent (self-reported) stomach distress had occurred in households that had not received potable water through the projects. More impacts of the RWS loans will become apparent soon. Many juntas (149) have not yet begun to deliver services because their systems are still in the design phase or under construction. Including these juntas, SENASA has helped create 424 local organizations. All of these will ultimately operate systems that regularly deliver potable water to their communities. The track record to date is exceptional. Not one junta has ceased to deliver services once its water system became operational—an organizational task of massive proportions and a significant community development achievement. The institutional development achieved is impressive: the hundreds of juntas that have been established in rural villages are stable and growing; and their members and directors have been trained to operate reasonably complex water delivery systems. The villagers maintain their own piped network, ensure the functioning of the pump(s) and water storage facilities, keep the system operational, keep books, and hold regular meetings. Almost all juntas have expanded their original operation, taking in new members and providing service to a broader pool of beneficiaries without additional Bank support. The RWS projects have also created employment and leadership opportunities for women in rural villages.

The greatest immediate threat to sustainability of the committees is excess consumption, commercial use, and misuse of water. The juntas' water systems were designed with only enough capacity to provide water for normal household purposes. Extravagant use—and there is no incentive to conserve water—can strain the system and leave the majority with an inadequate supply. Of concern in the intermediate term is that tariffs and fees for connection and disconnection do not reflect the true cost of operations in most juntas. Cost recovery and financial management are also serious issues. The juntas have a good record of water bill collection: receivables represent 5 to 15 percent of annual sales. About 49 percent of the Bank-financed juntas are one or more months in arrears to SENASA.

Further attention is indicated in some areas. Tariffs need to be set at sustainable levels. Weak juntas need additional administrative help over the short term. Water meters should be covered in the loans for new juntas, and existing juntas that are up to date with their payments should have access to credit sufficient for universal metering of household use.

Robert Picciotto by  
Elizabeth McAllister

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## **Preface**

The first standalone rural water supply (RWS) project financed by the World Bank was Paraguay RWS I in 1978. Including that first loan, the Bank has approved US\$92.2 million for four rural water supply and sanitation projects in Paraguay. The most recent of these, RWS IV, was approved in August 1997. Only two of the projects have been completed (Loans 1502-PA and 2014-PA). The third (Loan 3519-PA) is nearing completion. This Impact Evaluation Report assesses the medium- and long-term impacts of the rural water infrastructure constructed with the proceeds of these loans. The report was prepared by the Operations Evaluation Department (OED) of the World Bank. Field research for the study was conducted over a period of about one year.

The study team profited greatly from close collaboration with the Latin America and the Caribbean Country Department I, which paid and supervised the consultants who conducted the field survey. The study team particularly wishes to acknowledge SENASA for its participation, the UNDP-World Bank Andes Region Water and Sanitation Group for its assistance, and the task manager of Rural Water III-IV, Luis Chang, for his help. The Centro de Salud Publica San Juan and the Eighth Sanitary Region generously donated staff time and shared relevant health data with the study team. The team is also grateful to Letitia Obeng for her helpful comments on the work in progress. Karin Kemper shared her insights from preliminary data analysis work on the questionnaire.



## Executive Summary

1. The objective of this evaluation is to assess the impacts of the World Bank's assistance program on the performance of Paraguay's rural water subsector. The impact evaluation team used a participatory approach based on an evaluation workshop, key informant interviews, field visits, systematic data collection (including surveys of randomly selected key stakeholders), and beneficiary interviews.

### The Projects

2. In 1978, Paraguay RWS I was the first standalone rural water supply (RWS) project financed by the Bank. In total, the Bank has approved US\$80.8 million for four rural water supply projects, the most recent of which was RWS IV, approved in September 1997. Only two of the projects have been completed (Loans 1502-PA and 2014-PA). The third (Loan 3519-PA) is nearing completion.

3. The fundamental objective of the projects was to mitigate precarious living and health conditions in rural communities by providing safe water supply and sanitation facilities. The loans have financed the work of the National Environmental Sanitation Service (SENASA) with *juntas de saneamiento*, nonprofit committees legally constituted to manage water and sanitation within towns and villages of 400 to 4,000 inhabitants. Each Bank loan has followed the same community-based strategic approach, requiring that each participating village operate and maintain a standalone water system. Successive loans have extended coverage to new communities and geographic regions.

4. The *juntas* are responsible for all aspects of the community water system: they maintain a well site, keep pumps and the piped network in working order, clean and maintain water towers and reserve tanks, and handle accounting and monthly billing. In all the above, they work under the supervision of SENASA and with its assistance.

### Achievements and Impacts

5. The three loans have led to the establishment of 275 functioning community-based water systems giving more than 400,000 people a safe water supply and raising the coverage of rural areas from around 1 percent to about 20 percent over a 20-year period. In addition, SENASA delivered 952 training courses on health and hygiene and on water system management. These have directly benefited approximately 160,000 individuals, not counting the impact of the education on their families and the *juntas* themselves. More than 210,000 sanitary facilities were built in the rural areas, although most were constructed with other donor-induced investment rather than through activities of the Bank projects.

6. An OED review of Ministry of Health data for a 10-year period compared hospital visits for five villages that had received potable water through the project with five others that had not: deaths due to diarrhea were seven times higher in unserved villages. Similarly, a study of 150 villages found that over 95 percent of recent (self-reported) stomach distress had occurred in households that had not received potable water through the projects. Perhaps the most important impact, however, is the epidemic that did not happen. During many of the years the RWS projects

were active, cholera was rapidly spreading in the region. The projects' activities in hygiene education, sanitation, and the provision of potable water were probably instrumental in ensuring that Paraguay's rural population managed to escape the threat of cholera.

7. More impacts of the RWS loans will become apparent soon. Many juntas (149) have not yet begun to deliver services because their systems are still in the design phase or under construction. Including these juntas, SENASA has helped create 424 local organizations. All of these will ultimately operate systems that regularly deliver potable water to their communities. The track record to date is exceptional. Not one junta has ceased to deliver services once its water system became operational—an organizational task of massive proportions and a significant community development achievement.

8. The RWS projects have also created employment and leadership opportunities for women in rural villages. While women tend to be poorly represented among the elected leaders of the juntas, and only slightly better off in employment, their participation has been increasing. In 1996, women were 6 percent of junta presidents, 8 percent of vice-presidents, 27 percent of secretaries, and 17 percent of treasurers.

9. Another direct benefit of the project was improved income distribution. About half the families previously without access to public supplies purchased water from private vendors at prices of up to US\$8/m<sup>3</sup>. Under the project, they have access to larger volumes of safe water at a family expenditure of about 4 percent of the annual poverty threshold income level (see Table 5.1) as opposed to 12 percent of the annual poverty threshold income for limited quantities of unsafe water. Other project benefits on the community level include improved local coordination capacity, reduced disparity between rich and poor in terms of basic household amenities, improved environmental hygiene, and a strengthened private sector. At the household level, benefits include time and energy savings and productivity gains due to health improvements.

### **Sustainability**

10. The greatest immediate threat to sustainability of the committees is excess consumption, commercial use, and misuse of water. The juntas' water systems were designed with only enough capacity to provide water for normal household purposes. Extravagant use—and there is no incentive to conserve water—can strain the system and leave the majority with an inadequate supply. The original tariffs were flat rates based on the communities' ability to pay, as determined by a socio-economic study at the beginning of each project. Tariffs were supposed to be revised periodically with the assistance of SENASA, but in practice juntas that have not asked for assistance in this area have not been encouraged to raise rates.

11. Of concern in the intermediate term is that tariffs and fees for connection and disconnection do not reflect the true cost of operations in most juntas. Cost recovery and financial management are also serious issues. The juntas have a good record of water bill collection: receivables represent 5 to 15 percent of annual sales. About 49 percent of the Bank-financed juntas are one or more months in arrears to SENASA. SENASA estimates the average total payments the government receives from juntas is G.451 million a year, while the accumulated total arrears for the three rural water projects is G.262 million.

## Conclusions

12. Bank support for the rural water subsector in Paraguay has made a significant difference to rural families in a large geographic area. When SENASA's work under the first loan showed that the juntas were highly effective, the Bank financed a series of four increasingly larger projects that reduced the deficit in rural water supply, thereby attaining health impacts largely as anticipated. Among the other significant achievements of the RWS projects are that living conditions in the rural areas have improved substantially, infant mortality is down, waterborne disease incidence is lower, and the status and lives of women have improved.

13. The rural water infrastructure is in place and functioning. Moreover, the institutional development achieved is impressive: hundreds of juntas have been established in rural villages, they are stable and growing, and their members and directors have been trained to operate reasonably complex water delivery systems. The villagers maintain their own piped network, ensure the functioning of the pump(s) and water storage facilities, keep the system operational, keep books, and hold regular meetings. Almost all juntas have expanded their original operation, taking in new members and providing service to a broader pool of beneficiaries without additional Bank support.

## Factors of Performance

14. What made the Paraguay intervention a success?

- *Continuity of staffing.* The rural water supply loans were more dependent than many Bank projects on a series of complex events taking place in hundreds of villages in more or less the same way. A certain constancy of vision facilitates such an undertaking. Much of the success achieved is doubtless because the rural water projects have not changed task manager very often. Continuity of staffing permitted Bank-client relationships to develop a deeper understanding over a prolonged period. The lessons of success have been learned, and the Bank has been able to work with SENASA to see that once problems can be identified, they can be dealt with systematically.
- *Widespread rural electrification.* Near-universal rural electrification permitted the projects to use extremely reliable electric pumps. In most countries, one of the greatest problems rural water supply projects face is the maintenance, repair, and parts supply associated with gasoline and diesel pumps or handpumps.
- *Timely educational and training inputs.* Timely and coordinated use of training facilitated the skills upgrading process in the juntas and the diffusion of potable water-related health benefits in the villages. Although the effort was large-scale, the self-evaluation workshop participants highlighted the need for even greater efforts in this area, a finding that supports OED evaluation results in other countries.
- *The projects built on the country's social and cultural traditions.* Paraguay, like several other Latin American countries, is a nation where working together for the good of the community has a long tradition. Working on committees such as those created by these projects is a part of rural life.

- *Local ownership of infrastructure.* The juntas owe some of their sustainability and permanency to the fact that from the beginning they own significant and visible property. Not only was the service they provided essential and highly prized by the entire village, but there were places that all could see and where users unhappy with any aspect of the service could go and complain. The fact that SENASA charges for its assistance was both culturally astute and, in a way, supportive of a long-standing government practice of not fostering dependency.

## Recommendations

### 15. Further attention is indicated in some areas.

- *Tariffs need to be set at sustainable levels.* Too many juntas do not know the full cost of the service they provide. The biggest difference between the strongest and weakest juntas is income, a function of tariffs. Ultimately it is in interest of their members to replace expensive infrastructure (such as water towers) before the end of its useful life and not after.
- *Weak juntas need additional administrative help over the short term.* A junta with a computer costs less to run in the long term (boxes full of paper and file cards are tedious to handle, and important documents get misplaced). Computers also can make projections and otherwise provide information of importance to system managers and directors. The latter often have little time to spend in the juntas because they are volunteers.
- *Water meters should be covered in the loans for new juntas, and existing juntas that are up to date with their payments should have access to credit sufficient for universal metering of household use.* Every junta visited stressed the importance of starting out with meters. Even though the per capita costs appear to be very high if meters are included, those costs could be recovered very quickly because of the income the meters generate. Once system users get used to not paying the real cost for the quantity of water they use, it becomes extremely difficult for directors to make needed changes. The waste and misuse of water will only stop when all water is measured and paid for. But if water cannot be measured and charged for, it is too difficult for the juntas to raise the money to buy meters.
- *SENASA should be provided with technical assistance in knowledge management.* A persistent weakness in SENASA is its inability to get information to those who need it. Monitoring is taking place. The juntas produce monthly updates on work in progress, but no unit in SENASA collects and systematizes that data. As a result, most staff members keep their own files, and nobody knows who is keeping which file. This inevitably leads to coordination problems.
- *SENASA's evaluation capacity needs to be increased.* The self-evaluation workshop conducted for this study was the first such event in almost 20 years of implementation. Staff have learned how to run such workshops now, and they should

**be encouraged to hold more of them. Self-evaluation activities need to go beyond required Bank reports, and they need to involve field staff and beneficiaries.**



# 1. Study Objectives, Methodology, and Context

1.1 In the late 1970s, before the World Bank began financing rural water and sanitation projects, about 1 percent of Paraguay's widely dispersed rural population<sup>1</sup> had access to safe water from a piped supply system. After nearly 20 years of implementation (under three loans), about 20 percent receive service. The implementing agency, National Service for Environmental Sanitation (SENASA), created in more than 750 villages institutions to manage the day-to-day provision of safe water. This study examines the challenges these local water committees faced, identifies the difficulties SENASA has overcome, catalogues project impacts, and reviews the nature of the task ahead. The water committees, known as *juntas de saneamiento* (literally, sanitary boards) in Spanish, are referred to hereafter as *juntas*.

## Objectives and Scope of the Impact Evaluation

1.2 This impact evaluation reviews implementation since the beginning of the Bank's involvement but gives special attention to recent experiences and important current issues identified by the central government, local authorities, junta directors, and users. The objective of the evaluation is to assess the impacts of the Bank's assistance program on the performance of Paraguay's rural water sector. Especially important in this assessment are the various aspects of community management of water and sanitation systems, as well as broader considerations of policy and organization. The study also evaluates the effectiveness of the projects in improving health and reducing poverty.

### Basic Loan Data (actual)

Loan Number	Project Name	Amount (US\$ million)	Board Approval Date	Completion Date
1502-PA	Rural Water Supply	6.0	12/13/77	6/30/83
2014-PA	Rural Water Supply II	11.8	6/16/81	3/20/90
3519-PA	Rural Water Supply III	23.0	9/10/92	6/30/98 <sup>a</sup>
4222-PA	Rural Water Supply IV	40.0	8/28/97	12/31/03 <sup>a</sup>

<sup>a</sup> Estimated

1.3 The evaluation covers the provision of rural water (mostly through household connections) and extensive waterborne sanitation and latrine promotion. It evaluates the two completed projects on their achievement of physical objectives, sustainability, institutional development impact, Bank-client partnership, and stakeholder involvement. It also emphasizes issues facing the ongoing project and the project in preparation. The rationale for this approach is to highlight the rural water program's impact by establishing what the initial conditions in the sector were, what problems have been resolved, what issues are being tackled now, what objectives are within reach, and how effective the Bank has been in helping the client accomplish agreed-upon objectives.

1. More than two million people, about 70 percent of the total population, lived in communities of fewer than 4,000 inhabitants.

## **Methodology**

1.4 A study team visited Paraguay in May and June 1997 to conduct on-site inspections in 17 villages of four provinces. The team selected villages for broad regional coverage; to include weak, average, and strong juntas; and to cover the entire implementation period (from 1978 to the present) so that the effect of longevity could be detected. In each village, the team met with junta directors, employees, and project beneficiaries. In most villages representatives of the local municipality were also consulted. The team also visited facilities constructed with the proceeds of the loan, including water tanks, chlorinating facilities, administrative offices, and well heads.

1.5 The study used a participatory approach based on an evaluation workshop, key informant interviews, field visits, systematic data collection (surveys of randomly selected key stakeholders), and beneficiary interviews. The site visits, questionnaire results, and data collected by other government ministries were triangulated, that is, taken together, and used to evaluate the impacts of the projects on the beneficiaries and stakeholders. Central government and municipal officials, system operators, consultants, and other donors and bilaterals involved in Paraguay's rural water sector were interviewed. SENASA functioned as a co-inquirer within the evaluative process, and senior staff had an input on certain aspects of the research design.

1.6 On May 30, 1997, OED organized a workshop for key stakeholders and individuals who had participated in the implementation of the project. Senior staff from SENASA participated in the development of the workshop agenda/question plan and helped with logistics. The participatory evaluation session included representatives from participating municipalities, juntas, nongovernmental organizations (NGOs), and key members of each SENASA department. Their opinions and evaluative conclusions were published in a standalone volume.<sup>2</sup> This report broadly reflects those opinions and conclusions and cites them where appropriate.

## **Paraguay: Poverty and the Rural Areas**

1.7 Paraguay is rapidly emerging from 35 years of dictatorship. While the legacy of close to four decades of dictatorial rule is still visible, the country has made important strides in its quest to become a modern, democratic state. Paraguay is landlocked, and local businesses tend to deal in imported consumer goods or produce light manufactured goods that are not costly to export. Services tend to dominate the urban economy. The agricultural sector is of fundamental importance to the national economy and its future growth. The sector produces more than one quarter of Paraguay's GDP, employs about half the workforce, and generates 90 percent of registered exports. More than half of industry's value-added comes from agro-industry, and almost half the population lives in rural areas. The Paraguay Agricultural Sector Review (August 1995) notes that the future well-being of the agricultural sector is crucial to the economy as a whole and to the welfare of a major part of the population.

1.8 Extreme poverty is lower in Paraguay than in many countries with higher per capita incomes because income distribution is more equitable than average for Latin America. (The GDP per capita in Paraguay is US\$3,200; in neighboring Brazil it is US\$6,100, Colombia US\$5,300 [1995 estimates]). Living standards are also higher than in many neighboring countries because

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2. Evaluacion del Programa de Agua Rural y Saneamiento en Paraguay: Primer Taller Participativo de los Involucrados, Asunción: World Bank, SENASA, UNDP; May 1997.

Paraguay is not earthquake-prone, and investments in housing, to cite but one example, only need to be made once. The northeastern states, which hold most of the country's indigenous population, and some of the areas surrounding Asunción, which have been settled by rural migrants, have the highest poverty levels. The constitution assigns the government responsibility for the provision of social services to lower income groups, and the democratically elected governments have steadily increased social spending. From 1989 to 1994, for example, the government increased public health expenditures from 1.0 to 2.5 percent of GDP.

1.9 The projects serve 15 rural states<sup>3</sup> (listed in Table 4.1), which average about 6 inhabitants per square kilometer. In the most densely settled areas served by the projects, population density ranges approximately from 50 to 150 inhabitants per square kilometer. The main activities are agriculture (about 75 percent of the population), handicrafts, and small industries.

1.10 For the period 1992–1995 economic growth was less than 3 percent, about the same as the rate of population growth. Stagnating and in some places declining per capita income threatens the economic well-being attained thus far. Already it is resulting in reduced access to social services for the poor even while gross expenditures for social services are rising.

### **Municipalities: Historically Weak but Gaining Importance**

1.11 The decentralization of government services began in 1989 with the transfer of political power to municipal governments. Although before then municipal governments and councils had been elected, mayors had been appointed by the central government. Since 1991, mayors have become elected officials. Indeed, one reason SENASA opted to promote water systems through juntas rather than through the municipalities is that juntas were legally more powerful in critical areas—they were permitted to borrow money, for example—and economically better able to cope with the demands of the task. To some degree this situation is changing, and municipalities are becoming more important. The 1992 constitution (Article 168) broadens municipal responsibilities to include urban planning, environment, markets, tourism, health, police, traffic management, and the supervision of public transportation. To enable municipalities to fulfill their new role, Article 169 transfers the property tax previously collected by the central government to the municipalities. Municipalities are allowed to retain 70 percent of revenues, which altogether amounts to less than 5 percent of the central government budget. Still, the assignment of responsibilities across the three levels of government has not yet been specified, leading to a lack of accountability, duplication of some functions, and absence of others. Moreover, municipalities and departments lack the ability to manage their new responsibilities, and they have shown no tendency to become more involved in the provision of water than they have been in the past.

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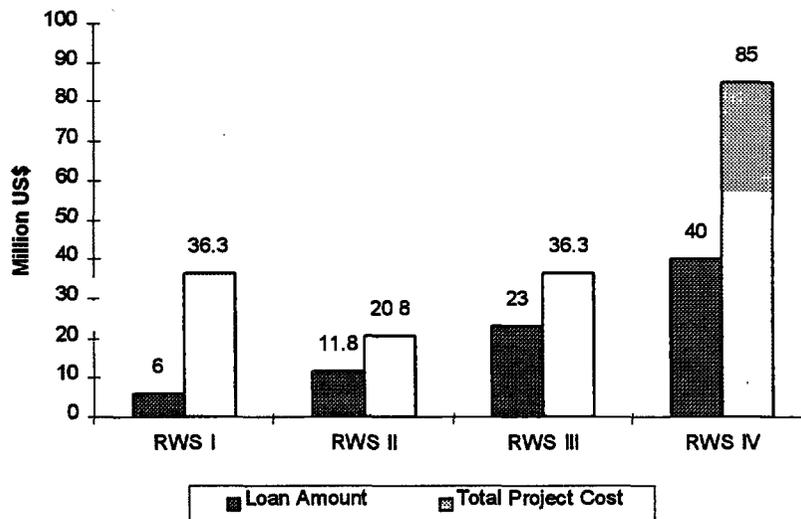
3. Paraguay has 17 states, locally known as departments.

## 2. The Project

2.1 Paraguay was the site of first standalone rural water project (Rural Water Supply, Loan 1502, US\$6.0 million) financed by the World Bank. Since the Bank began lending for Paraguay's rural water sector in FY78, it has approved US\$80.8 million for four rural water projects (Figure 2.1). The fourth loan was approved on August 28, 1997, and a fifth project is under preliminary consideration.<sup>4</sup> These projects represent 15 percent of the Bank's freestanding projects worldwide (4 out of 26) and 8 percent of the portfolio in dollar terms.

2.2 The 1978 loan was for community-based water systems. The follow-on loans require small towns and villages of 400 to 4,000 inhabitants to manage their own water and sanitation systems, each loan extending coverage to new geographic regions. Only two of the four projects have been completed (Loans 1502-PA and 2014-PA). The third (Loan 3519-PA) is nearing completion.

**Figure 2.1: Total Project Cost and Loan Allocations for the Rural Water Supply Program**



### Community-based and Utility-based Approaches in the Water Sector

2.3 Requiring each participating village to operate and maintain a standalone water system was innovative and experimental—in fact, the Bank has only recently<sup>5</sup> embraced participatory approaches as the preferred (most sustainable) way to solve the water problems of rural areas. In

4. Water and sanitation loans represent about 15 percent of all Bank lending to Paraguay.

5. Operational Policy (OP) 4.07 (July 1993). Some of the key issues are discussed in a 1993 Bank publication: Deepa Narayan, *Participatory Evaluation: tools for managing change in water and sanitation*. World Bank Technical Paper 207, ISSN 0253-7494, 1993.

the interim, Bank-financed projects elsewhere frequently took a more top-down approach to the needs of remote communities.

2.4 Historically the Bank has supported both utility-based and community-based water systems, with the former clearly predominating in dollar terms. Utility-based systems, as the name implies, are planned and operated by big water utilities (privately or publicly owned) that serve large populations. Utility-based water projects<sup>6</sup> everywhere have many similarities. However, utilities tend to function better in areas of high population concentration. In rural areas,<sup>7</sup> community-based systems are invariably characterized by active participation in system administration and direct local responsibility for all or certain aspects of operation and maintenance. Community water supply and sanitation projects (CWSS) normally include (a) community involvement in project planning and management of rural water supplies; (b) government promotion rather than provision of services; (c) demand-driven investment for basic water and sanitation services based on communities paying part of the capital cost and all normal operations, maintenance, and repair costs; (d) private sector provision of goods and services (to the extent possible); (e) maximization of health benefits by integrating water, sanitation, and hygiene education interventions; and sometimes (f) a special focus on women as users, planners, operators, and managers of water schemes.

2.5 The Bank-financed RWS projects in Paraguay typically have the following attributes and relationships:

- communities (juntas) own the well, pumping facility, and distribution infrastructure;
- communities manage the rural water supply systems;
- juntas pay part of the capital cost and normal operations, maintenance, and repair costs;
- SENASA promotes junta creation and provides technical support—but it steers juntas to private sector providers when repairs are needed (SENASA charges a fee when it provides services itself to encourage demand); and
- SENASA attempts to maximize health benefits by integrating water, sanitation, and hygiene education interventions with junta-promoting activities.

## Sector Context

2.6 Paraguay has extensive surface and groundwater resources, and because it is in the basin of the Parana and Paraguay rivers, it has tremendous hydroelectric potential. The Itaipu and Yacyreta hydroelectric projects, for example, have permitted installation of a widespread national grid of electricity supply throughout southern and central Paraguay. As a result, the majority of rural communities have access to a reliable source of electricity, and the Bank-financed projects have been able to provide wells with extremely reliable electrical pumps.

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6. For example, utilities charge published rates and follow procedures and regulations defined by the central and local governments.

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

2.7 Paraguay's first water supply system began operation in 1959 to serve part of Asunción. Until 1963 it was the only such system. Rural activities were rare. Only 10 of the country's 161 towns (excluding Asunción) had developed water supply systems by 1976, and even in these cases water was untreated and below acceptable standards. Many communities had to obtain water for domestic consumption from shallow (often seasonal) wells. River and stream water was widely used. Fortunately, good-quality groundwater is available at moderate depths (typically 80 to 150 meters) in sealed aquifers. Boreholes can be easily drilled in two to five days.

2.8 In villages where water sources were distant enough to make self-supply impractical, water—sometimes from questionable sources—was distributed by water carriers who sold 200-liter barrels at prices of up to US\$1.60 (US\$8 per cubic meter). Such high water prices constrained consumption and reduced water use for personal hygiene and laundry to a minimum. Sanitation provisions also tended to be minimal. Excreta disposal was usually by unhygienic traditional latrines.

2.9 Until the mid-1980s, unsafe water supplies and poor sanitation made health status in Paraguay worse than in many other countries with similar GNP. The Ministry of Public Health reports that diarrheal diseases have been consistently among the five major causes of hospitalization. A 1992 Public Expenditure Review by the Bank found that waterborne diseases are the major cause of infant mortality. Infant mortality was as high as 85 per 1,000 live births in some communities, although national averages were much lower.<sup>8</sup> Diarrheal and enteric diseases were the second most common cause of mortality for all ages. Among the main causes for the high deficit in rural services were weak institutional capacity, lack of rural subsector policies, and a low level of public investment.

### *Governmental Strategy*

2.10 The water sector in Paraguay received unprecedented attention in the 1980s, partly because of the (United Nations) International Drinking Water Supply and Sanitation Decade but also because of government concern with health statistics. Early in the decade, Paraguay subscribed to International Water Decade Goals, setting ambitious objectives for expanding water and sanitation services in urban and rural areas, strengthening sector institutions, and implementing cost recovery policies. These objectives were linked to broader goals of improving socio-economic conditions for settlers and native families suffering from lack of water and sanitation in the fast-developing agricultural frontier. Government efforts to achieve these objectives during the 1980s raised water supply and sanitation from 5 percent coverage to about 20 percent nationally, still low by South American standards. Nevertheless, while urban coverage improved in response to government determination, rural service lagged many years behind. The numbers hide the true differences: rural coverage is also about 20 percent (as of January 1998), but the pattern of service availability leads to significant inequalities. In unserved rural areas there may be no safe water for many miles, while in urban areas water is usually available from a neighbor or a nearby standpipe.

2.11 The community-centered strategy for the provision of rural water evolved very little from RWS I through RWS III. Although the development of local water committees was a slow process

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8. Currently 23.2 deaths per 1,000 live births (1996 estimate). Source: *The World Factbook 1996*. March 12, 1997. U.S. Central Intelligence Agency. November 1997. <<http://www.odci.gov/cia/publications/nsolo/factbook/pa.htm>>.

that required substantial technical and administrative follow-up, the juntas usually functioned as intended, and they were very popular with the beneficiaries. Service level choices were largely left to the individual beneficiaries after they were connected. For example, decisions about whether to leave the water out in the courtyard or to bring it inside into kitchen sinks and bathroom facilities were left up to each family, who also had to pay for such facilities.

2.12 The areas where the juntas work are more like small towns than sparsely populated rural zones. RWS I plans called for supplying house connections only in areas with more than five houses per 100 meters of street length. In practice, this approach was not strictly followed, each successive project served a larger number of beneficiaries and constructed fewer standpipes than its predecessor. With RWS IV (not yet in implementation), project planners have envisaged pilot endeavors with new strategies to increase coverage and reduce costs. Among the innovations planned are new extraction technologies, smaller networks built with lower-cost materials, and a focus on the extremely poor indigenous communities of the Chaco region.

### **Institutional and Legal Framework for Water Supply in Paraguay**

2.13 SENASA was created in 1972 as a unit of the Ministry of Health to develop water supply and sanitation systems in communities of up to 4,000 inhabitants. SENASA is aided in its work at the local level by *juntas de saneamiento*, legal entities responsible for promoting adequate health practices in their communities. The Ministry of Public Health and Social Welfare confers legal status on the juntas.<sup>9</sup> Their five- to nine-member boards of directors are elected by public vote and consist of a chairman, vice chairman, secretary, treasurer, and one to five other voting members.

2.14 Overall responsibility for water supply and sanitation sector planning rests with the Technical Planning Secretariat of the Presidency. All investment plans must be approved by the National Council for Economic Coordination before they become eligible for government financial support. Responsibility for preparing sector plans, however, is left to the initiative of the main sector institutions, the Corporation for Sanitary Works (CORPOSANA, which works in urban centers) and SENASA (for rural towns and villages).<sup>10</sup> A high-level Coordinating Committee, in which all involved agencies participate, coordinates sector activities and prepares long-term plans.

2.15 Since a 1991 restructuring, SENASA has had a separate Directorate of Water and Sanitation. SENASA also has two other directorates, one for environmental health and the other for administration. All activities involving ongoing field work (managing the field staff, handling all phases of support to the juntas, and so forth) are the responsibility of an Operations Department. This department has a unit that coordinate all training activities and oversees the social promotion and health education programs related to water and sanitation. Another division, Financial Management of Juntas, provides technical support to the juntas in preparing financial statements, setting contributions and tariffs, billing and collection, and managing repair funds. At the field level, SENASA has a system of supervisors in the 15 regions into which the Ministry of Health's operations are divided. Each supervisor has between 6 and 14 inspectors and assistants, depending on the area and population of the region.

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9. Their authority is derived from Law No. 369/72, which established SENASA, and Decree No. 8910/74, which approved regulations governing their formation and responsibilities.

10. A third organization under the Ministry of Defense is responsible for sector activities in the Chaco region.

## Self-help Committees

2.16 Rural Paraguayans share a tradition of working together that goes back centuries. Many rural communities still practice an Indian tradition known as the *minga*—a day of shared work for the benefit of the community—which can be called by municipal authorities. This was particularly important during the dictatorship, when rural infrastructure suffered from underinvestment: government did not see the solving of rural problems as its role. As a result, rural people tended not to wait for outsiders to come in and solve their problems. Paved roads are scarce and less than 40 percent of households have electricity, for example. As a result, committees for local betterment (such as road introduction or school committees) have been very active for decades—forming a committee to solve a local problem is an understood and accepted modality in rural areas.

2.17 *Juntas de saneamiento* are nonprofit committees legally constituted to manage water and sanitation matters within a defined geographic area (usually a single village). They are entitled to own property, contract debts, and operate services. In function they are similar to local cooperatives, which are common throughout Latin America. Generally the juntas take responsibility for all aspects of the community water system: they maintain a sanitary well site, keep pumps and the piped network in working order, clean and maintain water towers and reserve tanks, and handle accounting and monthly billing. In all the above, they work under SENASA's supervision and with its assistance.

2.18 After indicating to SENASA their desire to have a potable water system, villagers form a junta. The first directors are usually civic leaders and prominent citizens. The operation of the committees follows a standard pattern set by SENASA: a document<sup>11</sup> SENASA gives them describes the organization and the obligations of each committee and defines the relationship between the committees and SENASA. Committees are first organized provisionally. Once they obtain their legal charters, new boards are elected. Once a committee has a legal existence, it discusses with SENASA staff the details of the system the community would like, and it raises its contribution to the initial system cost, partly in cash and materials. It also organizes the local contributions to labor during construction (although this has been limited to gathering materials in RWS II and III). When construction is complete, the system is formally handed over to the junta, which then entirely owns the system and buildings. Until the formal handover, no payments are due. There is also a period of grace for the first six months of system operation.

## Project Objectives and Components

2.19 The fundamental objective of the first three rural water projects in Paraguay was to mitigate the precarious living and health conditions of rural communities by providing safe water supply and sanitation facilities. Most of the beneficiary population in the project communities received water services through house connections. Although the project has a component to build public standpipes, very few were built and their impact was not significant.

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11. In the Rules and Regulations for the Sanitary Committees (Reglamento de las Juntas de Saneamiento, Decree 8910, Sept. 10, 1974).

### *Objectives*

2.20 The principal project objectives were to:

- provide chlorinated water to rural communities;
- provide sanitary units in rural communities and help construct safe latrines;
- promote better hygiene habits and public health improvements;
- strengthen the managerial and operational capabilities of SENASA;
- encourage community participation in the project, raise a community contribution to initial investment, and foster local commitment to maintenance; and
- ensure partial recovery of the investment.

### *Components*

2.21 Each of the three projects had the following components (Annex A summarizes individual loan objectives and the degree to which they were achieved):

- Construction of new water supply systems or extension of existing ones in rural communities. (A typical water system would include a drilled well 100 to 200 meters deep; pumping equipment and a chlorination system; a 10 to 100 cubic meter storage tank; and a distribution network with house connections serving about 80 percent of the population and standpipes to serve the remaining population.)
- Installation of sanitary units.
- Provision of equipment, tools, and technical assistance for the construction of latrines, septic tanks, and drainage fields.
- Procurement of equipment and tools for regional laboratories, well drilling operations, and community repair shops.
- Procurement of trucks for SENASA's construction supervision.
- Provision of educational and promotional programs in basic public health in the participating communities.

2.22 Strengthening SENASA's capacity for project preparation and its capability for supervision was essential to the implementation of the rural water supply projects. A technical assistance program in each loan provided long-term strengthening of SENASA's abilities. Program activities included the provision of consultants for project management; technical support for SENASA's headquarters staff (*inter alia* in well construction, operation and maintenance of systems in the communities, and accounting); training for SENASA field personnel, sanitary inspectors, and plumbers in the communities.



### 3. Water and Sanitation Service Provided, and Resulting Health Benefits

3.1 SENASA, under the Bank-financed projects, helped establish 275 community-based water systems over about 20 years. As of June 1997, these systems were benefiting more than 400,000 rural Paraguayans (Table 3.1). The projects worked with villages in the most rapidly developing areas of the country, many of them quite near SENASA's Directorate of Water and Sanitation in San Lorenzo. This proximity facilitated technical support in the early years, when small modifications in program approach were needed.

**Table 3.1: Physical Achievements of the Rural Water Programs**

Loan	Number of Systems	Number of Villages Served	Beneficiary Population
RWS I	47	47	187,490
RWS II	51	51	94,765
RWS III	177	194	119,060
<b>Total</b>	<b>275</b>	<b>292</b>	<b>401,315</b>

Loan	Household Connections	Public Standpipes	Non-Perforated Wells
RWS I	37,498	47	2
RWS II	18,953	37	3
RWS III	23,812	10	0
<b>Total</b>	<b>80,263</b>	<b>94</b>	<b>5</b>

3.2 At appraisal RWS I, II, and III were expected to supply water services through house connections in areas with more than five houses per 100 meters of street length. Less densely populated areas would have to settle for shared public access (standpipes). SENASA hoped to provide a larger number of standpipes than it actually did—only 94 public standpipes were constructed under the three loans. None were seen in the communities visited during this evaluation.

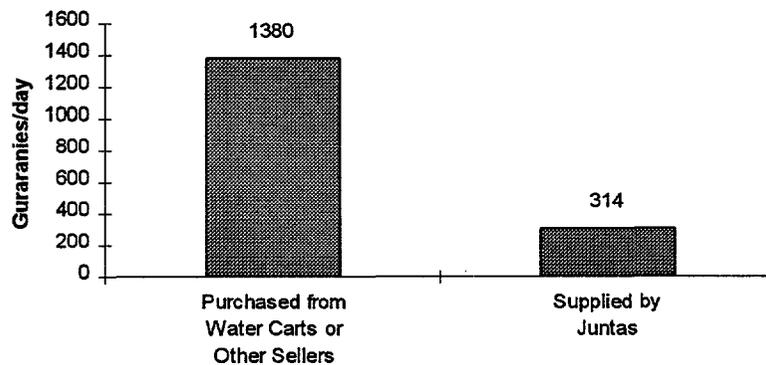
3.3 About 10 to 15 percent of the population in the villages served has not been able to afford a connection to a junta system, and there are not enough standpipes to serve those families who could not afford system water, so they must either use traditional sources or buy water from neighbors who have system connections. Juntas have been hesitant to build standpipes because of the significant costs of operating and maintaining them. Moreover, collecting a fee is expensive and fraught with conflict, the more so because the juntas cannot exclude non-payers.

3.4 Greater attention to the problems of the poorest families is planned. The fourth RWS project will build 350 new systems in the current pattern, expand 80 existing systems, and construct 50 systems for highly dispersed indigenous communities in the Chaco region, using a range of technologies and approaches tailored to local conditions. Successful achievement of RWS IV's objectives will increase rural coverage from 20 percent to about 35 percent by the end of the project.

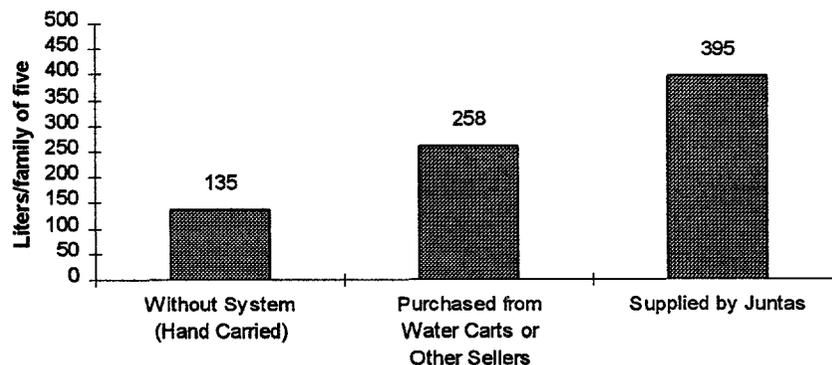
## Water Use

3.5 During 1996–97, SENASA’s Department of Operations studied conditions in 20 villages served by RWS I and II and compared results with 130 villages that were to be served by RWS IV (but which had no functioning junta, or were only partially served by a junta system [see also Table 5.1]). Data were obtained by questionnaire, so consumption levels from informants not connected to water systems are self-reported. The study clearly demonstrated the high cost of purchasing water outside the network (Figure 3.1). It also showed that people connected to networks used the most water, while those who had to carry it from distant sources used the least (Figure 3.2). People who had a well nearby used more water (and incurred no cash cost) than those who purchased water.

**Figure 3.1: Comparison of Water Costs**



**Figure 3.2: Comparison of Water Consumption**



## Sanitation Infrastructure

3.6 During the May 1997 workshop with SENASA staff and other stakeholder groups, there was widespread agreement that the demands of constructing and helping the local committees to maintain the potable water systems have always received the bulk of project resources and staff time. Participants found this situation understandable but lamentable, considering how important sanitary arrangements are to achieving the major project objectives. Field staff enjoy working on tasks that are of high priority to the juntas and respond to strongly felt needs. Many rural villages have ample land, large plots, and little felt need for sanitation: families living in zones without water systems had extremely low rates of self-reported diarrhea and vomiting. Nevertheless, 212,656 sanitary facilities (22 percent modern bathrooms, 78 percent latrines) were built in areas that SENASA supervises, although most of these were due to other donor-induced investment, rather than direct activities of RWS I-IV.<sup>12</sup> The study used both official statistics and self-reported health data to evaluate project impacts on the health of the beneficiary villages.

## Impact of Water and Sanitation Infrastructure

3.6 There are no statistics on the incidence of cholera in the project area. Cholera broke out in Peru in 1991. Between 1991 and 1992 Latin America had approximately 700,000 cases of cholera, most of them in South America. Peru, Ecuador, Colombia, Bolivia, and Brazil were all seriously affected (to a much lesser degree, so were Mexico, Guatemala, and El Salvador). Only the most careful epidemiological study can attribute responsibility for halting the spread of a contagious disease. Nevertheless, neglecting to mention that a cholera epidemic was sweeping several neighboring countries while not troubling the project area (where sanitation was improved, a hygiene education campaign was under way, and chlorinated water was in widespread use) might overlook one of the project's most important impacts.

3.7 Conditions in Paraguay's Eighth Sanitary District were propitious for the study of project health impacts. The San Juan Hospital, which served the entire district of 10 large villages, covered 5 villages that had piped water systems operated by juntas, and 5 that had no systems and relied on traditional sources. Climate, topography, and water access were similar, and no village was excluded.

3.8 The difference between the two sets of villages was dramatic. From 1987 through 1996, 89 children under the age of five died from diarrhea in the communities without potable water (Table 3.2). During the same period, only 12 children died in communities with potable water. Ten of those deaths occurred in the first five years for which data were available (1987-91), a period when system construction was not fully complete and household connections were still being made. From 1992 through 1994, not a single child died of diarrhea in the villages that received a Bank-financed system. In the villages with traditional water sources, 6,982 children were hospitalized for diarrhea during the 10-year period of the water project (Table 3.3). In the

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12. SENASA records do not disaggregate by Bank loan, so only cumulative figures by region are available. Other donors and nongovernmental organizations have promoted the construction of latrines in the project area, so it is not possible to exclude these contributions from the total figure. In general, dry wells are used and no treatment is available for sewage.

villages with water systems, the number of children hospitalized for such symptoms was much lower—1,758. In 1996 alone, 550 children under the age of five from communities without the new water systems were treated for diarrhea at San Juan Hospital—more than five times the number (94) treated from villages with juntas.

**Table 3.2: Mortality Due to Diarrhea, Children Under Five Years of Age in the Eighth Sanitary Region, 1987–1996**

District	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
<i>Communities without Juntas and Potable Water</i>										
San Juan Bautista	2	2	1	2	1	0	1	2	0	0
San Ignacio	7	3	6	1	2	1	3	7	1	5
Santa Rosa	3	1	2	2	1	0	6	4	3	3
Ayolas	0	2	2	1	1	1	0	3	0	1
Yabebyry	3	2	1	1	0	0	0	0	0	0
<b>Total</b>	<b>15</b>	<b>10</b>	<b>12</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>10</b>	<b>16</b>	<b>4</b>	<b>9</b>
<i>Communities with Juntas and Potable Water</i>										
Santiago	1	0	0	1	0	0	0	0	0	0
Santa Maria	1	2	1	0	1	0	0	0	1	0
Villa Florida	0	0	0	0	0	0	0	0	0	0
San Miguel	0	0	0	0	0	0	0	0	0	0
San Patricio	0	2	1	0	0	0	0	0	0	1
<b>Total</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>

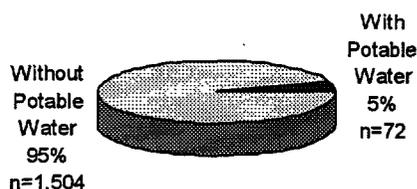
**Table 3.3: Incidence of Diarrhea, Children Under Five Years of Age in the Eighth Sanitary Region, 1987–1996**

District	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
<i>Communities without Juntas and Potable Water</i>										
San Juan Bautista	119	114	182	133	90	69	68	121	31	69
San Ignacio	170	130	225	118	72	227	236	350	243	213
Santa Rosa	138	133	205	223	196	193	188	165	102	78
Ayolas	280	254	147	277	156	114	117	266	127	161
Yabebyry	62	94	40	46	42	38	39	74	18	29
<b>Total</b>	<b>769</b>	<b>725</b>	<b>799</b>	<b>797</b>	<b>556</b>	<b>641</b>	<b>648</b>	<b>976</b>	<b>521</b>	<b>550</b>
<i>Communities with Juntas and Potable Water</i>										
Santiago	53	44	43	11	21	45	46	82	27	29
Santa Maria	69	80	180	54	31	47	48	54	17	11
Villa Florida	71	32	32	36	18	13	13	29	9	16
San Miguel	8	23	38	35	29	24	24	39	18	20
San Patricio	19	18	45	33	29	22	22	24	9	18
<b>Total</b>	<b>220</b>	<b>197</b>	<b>338</b>	<b>169</b>	<b>128</b>	<b>151</b>	<b>153</b>	<b>228</b>	<b>80</b>	<b>94</b>

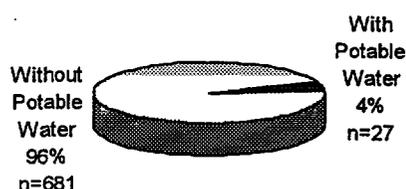
3.11 Health improvements in rural areas usually require more than the introduction of potable water. A recent OED evaluation in Africa, for example, showed that the introduction of handpumps did not lead to health improvements because the parallel effort in health education and sanitation was too feeble and not sustained long enough.<sup>13</sup> The impacts of water systems usually are maximized by parallel education programs; SENASA's educational efforts are described in para. 4.20.

13. See OED *Precis* 154 "Mali Rural Water."

**Figure 3.3: Incidence of Diarrhea within the Past 15 Days**



**Figure 3.4: Incidence of Vomiting within the Past 15 Days**



3.12 In 1996–97, SENASA sent a team of researchers to rural villages to ask about recent health problems (Figures 3.3 and 3.4) in more than 20,000 households.<sup>14</sup> The survey team sought information only about the two-week period immediately preceding the day of the interview because self-reported health data become increasingly unreliable over longer periods of recall. The families without potable water piped to the home had an incidence of diarrhea three times higher than families with potable water. They were also 3.5 times more likely to have experienced a sickness that provoked vomiting.

3.13 The same pattern held true when informants were asked about recent mortality due to waterborne disease symptoms. The communities surveyed had 12 incidences of death caused by diarrhea and concomitant dehydration in families that did not have potable water (0.02 percent). Households that received piped water from a junta system had no instances.

### Operational Effectiveness of the Junta Water Systems

3.14 SENASA charges for the technical support it gives to more than 300 communities when system breakdowns are beyond a village's repair capabilities. On average, communities experience a major pump problem requiring the assistance of a SENASA technician (typically, for the removal of the pump from the bottom of the well) once a year. Each junta is required to have a spare pump, and some juntas have informal agreements to share an additional pump as a double backup. Because of the spare units, the longest that users have gone without water is two days—under optimal conditions replacement can be done in one day. In interviews with system users, informants consistently refused to class service interruptions as a significant problem. Occasional extreme swings in voltage burn out small sections of the control panel, but these are far easier to repair, and many juntas have invested in voltage regulators to reduce the scale of the problem. A third common problem is caused by pipe breakage along the system. System operators can usually fix these problem within two hours.

<sup>14</sup> 17,644 individuals in households with access to water systems, 101,787 without.

### *Quality Monitoring*

3.15 SENASA field staff monitor the quality of water randomly in more than 300 systems. They measure chlorine content, residual chlorine, and acidity (pH) and check for the presence of *E. coli* and other bacteria. No program or timetable governs these quality checks, however, and they tend to happen when juntas call in SENASA staff for other purposes. The staff in charge of this process admit to finding more than the occasional instance of systems that have run out of chlorine because the officials in charge had not yet purchased additional supplies. Nonetheless, system integrity and water quality from the source is such that negative health impacts have not been reported to SENASA as a result of these lapses. The passing of the cholera scare undoubtedly decreased the priority given to this task.

## 4. Community and Institutional Development Achievements

### The Growth of Committees for Water and Sanitation

4.1 Since the first RWS project, SENASA, in association with local municipalities, has helped establish juntas throughout the most populated areas of Paraguay. As of May 1997, 424 juntas were legally constituted (Table 4.1), 291 of these have operational water systems. The remainder are either still in the system design phase or under construction.

**Table 4.1: Juntas Legally Established Since 1978**

State	Water Systems Currently Functioning	Water Systems Not Yet Operational	Total Number of Juntas Established 1978-97
Concepcion	9	1	10
San Pedro	25	12	37
Cordillera	36	24	60
Guaira	13	7	20
Caaguazu	23	5	28
Caazapa	9	10	19
Itapua	33	33	66
Misiones	7	8	15
Paraguari	18	9	27
Alto Parana	28	8	36
Central	59	5	64
Neembucu	14	0	14
Amambay	2	1	3
Canindeyu	10	4	14
Pte. Hayes	5	6	11
<b>Total</b>	<b>291</b>	<b>133</b>	<b>424</b>

*Note:* Includes communities that formed juntas without Bank-financed credit.

4.2 Working in widely scattered rural villages, SENASA has helped create hundreds of viable local organizations. Not one junta is moribund; each has proved capable of operating systems that deliver potable water daily to the participating families in their communities. Not one junta has ceased to deliver services once the water system became operational. This is an organizational task of massive proportions and a significant community development achievement, especially when compared with the experience of the cooperative movement in Latin America, which received far greater donor support. To their host communities the juntas are both a means and an end: although they are service providers, the creation of community organizations that foster local leaders and provide employment and growth opportunities is also important. On the technical side, the project introduced appropriate engineering designs and standardization of materials, so that private sector providers of spare parts and repairs are spreading.

### Private Sector Providers

4.3 In some communities juntas face private sector competition. More than 250 private sector operators (*aguaterias*) are providing water services in Asunción, other urban areas, and even in some of the villages served by SENASA-supported juntas. The cost of service provided by the private water companies is often higher (about 40 percent) than SENASA and CORPOSANA,

because no government subsidy is applied to system construction. SENASA staff are generally not inclined to say much that is positive about *aguaterias*. They note that in many cases *aguaterias* offer only 8 to 12 hours of service daily, and monthly service charges are generally two to three times higher than CORPOSANA's. Government policy on private water providers is unclear. Privatization is an important priority, yet juntas have been a great success. Because of the size of their systems, however, and the fact that public agencies prefer to invest scarce resources in areas that as yet receive no service whatsoever, public officials often see *aguaterias* as a useful supplement.

4.4 An *aguateria* is often created when an entrepreneuring family with access to clean water offers water services to a group of neighboring families to recoup investment costs and operating expenses. Private water providers tend to be small, ranging from 50 to 500 connections. To keep operations simple, they usually charge a fixed monthly price. Each family signs a contract specifying the daily amount of water to be provided and the cost of that water.

4.5 At their inception in the mid-1980s, *aguaterias* tended to be individual urban households with access to more water than they needed. As the practice spread, entrepreneurs became interested in entering the business and in constructing more profitable systems. *Aguaterias* flourished in and around Asunción in areas that, at that time, would not have received service from SENASA or CORPOSANA in the foreseeable future. Subsequently, *aguaterias* have experienced some degree of consolidation, largely due to buyouts and the emergence of a few strong companies that specialize in investments in the sector. As a result of market saturation and increased competition among neighboring systems, *aguaterias* have now expanded to rural areas in the interior of Paraguay.<sup>15</sup> The immediate future of *aguaterias* is unclear as investments in private water providers have been reduced, both because of local economic conditions and because businesses are waiting for regulatory decisions on laws that will govern their activities.

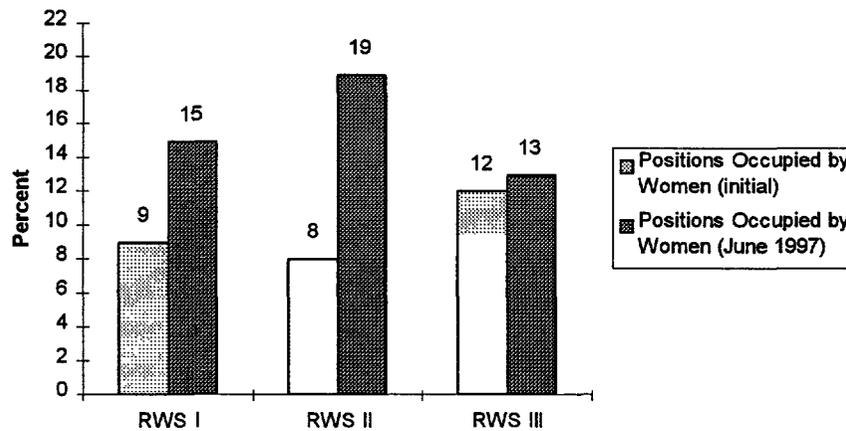
4.6 Under RWS IV the Bank is exploring various modalities for expanding coverage by working with private providers. SENASA staff, however, are deeply committed to the junta process. Further, politicians appreciate the ribbon-cutting opportunities inherent in the promotion of community-owned and -run committees that own water towers and attractive offices—which are turned over to them following formal ceremonies and speeches by the highest political leaders. While juntas may provide water at a lower cost, and help to develop the village leadership structure, the relatively high per capita investment costs and the plan to limit subsidies to the most impoverished areas indicate that private providers will play a larger role in future.

### **Impact on Women**

4.7 The RWS projects have created employment and leadership opportunities in rural villages where these did not exist before. That is, the juntas offer both paid work and elected offices, and women can compete with men for these slots. While women tend to be poorly represented among the elected leaders of the juntas, and only slightly better off in terms of employment, over time their level of participation has improved (Figure 4.1).

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15. The prevalence of *aguaterias* was first recognized when the government undertook a census in 1992 to clarify their scope and ownership. A consultant studying *aguaterias* for the World Bank in April 1997 generously shared some of his findings with OED.

**Figure 4.1: Increase in Women's Participation in Juntas**

4.8 Table 4.2 shows the number of positions that became available as a direct result of the establishment of juntas, how many of those positions women were actually able to attain at the time the juntas were created, and how many they occupied as of June 1997. The numbers combine director positions and employee slots in juntas that were functioning in June 1997. For local board of director slots, in 1997 women were 6 percent of junta presidents, 8 percent of vice-presidents, 27 percent of secretaries, and 17 percent of treasurers.

**Table 4.2: Women's Participation in Juntas**

	RWS I	RWS II	RWS III
Number of Villages	45	42	177
Total Number of Positions	315	294	1,239
Number of jobs held by women (initial)	27	24	150
Number of jobs held by women (6/97)	46	55	156

4.9 Improved water supply and access to adequate sanitation have positively and directly affected the quality of life and productivity of rural women that use junta-supplied water in their homes. Easier access to safe water (and an assured supply) allows women to provide a cleaner environment in their homes, to wash their children, to wash their own and their children's hands more often, and to keep food preparation areas clean. Children's education is also greatly enhanced by good health (and nutrition is improved by adequate hygiene). All the above can also lead to higher self-esteem and a greater sense of self-worth.

4.10 Women generally have time for other activities or more free time because of the RWS projects. Because providing water for the family is generally the responsibility of women in Paraguay, and water sources could be quite far from the houses, women had to walk long distances carrying water containers (often carrying children at the same time). According to project documents, women and children reported spending more than three person-hours a day collecting water in some communities. The time savings accruing to women from reduced transport of water, especially in poor households, permits greater labor inputs in agricultural activities during seasonal peaks (planting and harvest times) for which there is strong demand. It

also provides valuable opportunities for earning extra income and more time to spend with the children.

### Poverty Impact

4.11 Health improvements caused by increases in the supply of (affordable) potable water tend to benefit disproportionately families with lower income because higher income families probably already had access to sufficient water. Still, the poorest of the poor are often unwilling to commit to making monthly payments for water. SENASA research in some of the project communities estimated that about 60 percent of the families living in the villages belong to the poverty target group. Staff estimate that in villages served by juntas, 10 to 20 percent of families choose not to connect. While a few of these non-users probably already have adequate supplies, the vast majority believe they cannot afford the service. Because some of the poorer families do not request household connections, only about 40 percent of those people who benefited from house connections are estimated to belong to the poverty group. SENASA monitoring in a small sample of communities shows rising average family income with the passage of time, due to rising rural incomes and inflation.

Average income of water system users	Guaranies
In 1978 (RWS I)	230,000
In 1984 (RWS II)	270,000
In 1996(RWS III)	428,281

The population benefited by the provision of latrines also belongs to the poverty group (see para. 3.6) as the better-off already had facilities.

4.12 The project had income distribution effects, since about half the families without access to public supplies purchased water from private vendors at prices of up to US\$8/m<sup>3</sup> before they were supplied by the project. Under the project, they have access to larger volumes of safe water at a family expenditure of about 4 percent of the annual poverty threshold income level (see Table 5.1) as opposed to 12 percent of the annual poverty threshold income for limited quantities of unsafe water.

4.13 The improvement in health status (described in Chapter 3) arising from reduced waterborne disease morbidity contributes to higher labor productivity. In addition, the project generated significant employment at both construction and operation stages. (SENASA field staff estimate that the average monthly salary paid to junta employees was G.300,000.) This particularly benefits poorer households, whose involvement in the construction and service sectors of the rural economy traditionally has been great.

4.14 An objective of RWS I was to use system construction (which is labor intensive) as an opportunity to provide paid work to rural families,<sup>16</sup> thereby helping them cover that part of the cost of the potable water system contributed by the villagers. Later projects abandoned this because agricultural tasks and other commitments were found to impede the ability of villagers to dedicate their time to system construction. Now that contractors do the work, systems come into service much quicker. Contractors still provide some jobs to local residents; they pay more, they hire fewer locals, but they require daily attendance on the job site.

### **Environmental Impact**

4.15 The environmental impacts of the project are difficult to quantify, but clear improvements have occurred. Foremost among them would be the capacity development that has taken place because of Bank-funded institutional strengthening in an important environmental agency. SENASA, it will be recalled, is the National Service for Environmental Sanitation. 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 tubewell sites and disseminating state-of-the-art water seal designs.

4.16 The hygiene education and latrine 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 limited risk to water resource integrity is due to a lack of incentives for conservation (see paras. 5.5–5.6).

4.17 The risk of local contamination of groundwater through concentrated underground disposal of excreta in latrines was supposed to be addressed by careful siting 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.

### **Health and Hygiene Training**

4.18 The purpose of the educational and promotional program is to stimulate village participation in the project and to ensure full realization of the health benefits potentially available with the introduction of safe water. This training and outreach program, undertaken by SENASA staff, includes seminars for junta members on basic administration (including basic accounting and assistance in the formulation of tariff structures) and technical training that imparts skills critical for the safe and sustainable operation of rural water systems. SENASA also provides highly specialized training for system operators. An additional focus of the educational campaigns is to provide seminars and lectures to village housewives and school children on the optimal use of water, how to maximize health benefits, and basic sanitation practices. SENASA's files show that staff undertook 952 community outreach training events during the implementation of RWS I–III. Approximately 160,000 participants attended.

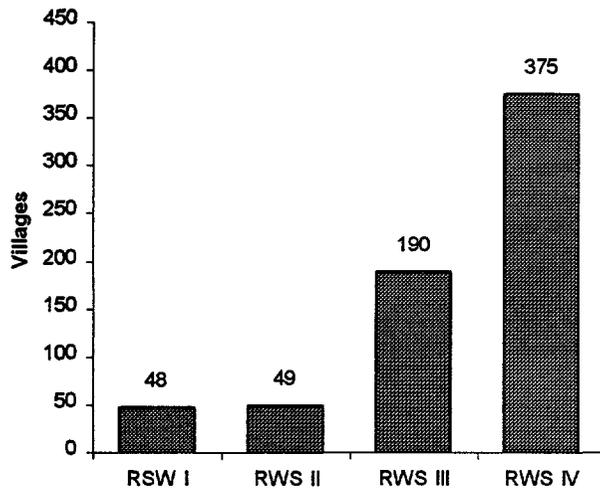
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16. In 1977, about 56 percent of Paraguay's rural population earned an annual per capita income of less than US\$160.

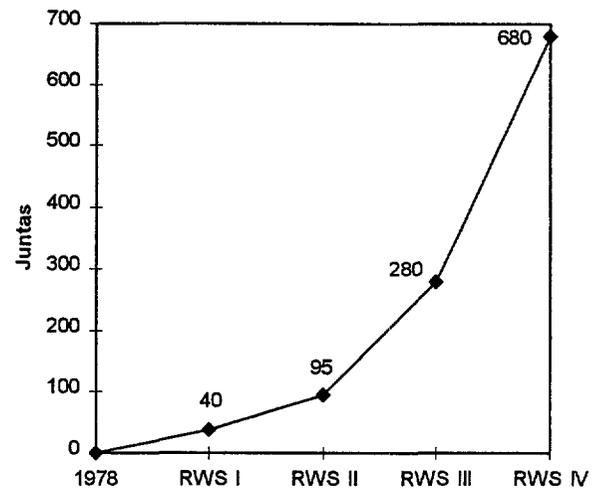
## Stretch Objectives for SENASA

4.19 SENASA's work under the first loan showed that juntas could be effective service-delivering structures. In recognition of the demonstrated potential of community-managed water systems, Bank support for each of the three follow-on projects that built on the same community-based system has increased (Figure 4.2).

**Figure 4.2: Number of Villages Served by the Rural Water Program**



**Figure 4.3: Number of Juntas Needing Administrative and Technical Support**



4.20 SENASA's promotion activities at the community level have focused on organizing the juntas, developing their commitment to participate in the project from initial planning and financing, fostering their capacity for the subsequent operation and maintenance of the systems, and encouraging a commitment to cost recovery. Because of the dramatic increase in the number of subsector organizations (juntas), however, the manner in which SENASA provides follow-up and the time allotted for the task has had to evolve. For instance, the proposed number of new juntas will more than double under RWS IV (Figure 4.3), and the new organizations will be separated from Asunción and from each other by far greater distances, especially those groups that will be in the Chaco. Even with a substantial increase in staff (which is not anticipated) SENASA would find it impossible to assist each junta in the same manner as before. This may be problematic. The enviable track record of the juntas—most notably their continued operation as service deliverers—has been a function of careful follow up and timely visits by field staff.

4.21 To some degree, the vacuum caused by the escalating demands on SENASA staff time is being filled by new organizations and businesses. As the demands of the most recently established committees and those still in formation increasingly occupy the full implementation capacity of SENASA, older juntas that feel they need assistance are increasingly finding the private sector ready to cope with problems. For example, many juntas have hired accountants because SENASA staff have little time to help treasurers with bookkeeping problems. Finding a local electrician to fix electric panel problems, the most common repair needed at the pumping station, is reportedly less difficult than a few years ago. There is also an Association of Juntas and a Cooperative of

**Juntas through which juntas can provide themselves and each other with services originally provided by SENASA. Among the services provided are managerial assistance (such as management information systems, computer training, standardized receipts and forms, spare pump rental, and equipment loan and repair). Under RWS IV, SENASA has agreed to promote the establishment of an Association of Juntas in each Regional Department with the purpose of providing support and self-help assistance to the juntas.**

**4.22 Benefits arising from the institutional strengthening of SENASA financed under the three Bank loans include a faster rate of implementation and greater cost effectiveness. Arguably the sustainability of the juntas' work, in both existing and new schemes, has been increased through better design, management, and supervision—all a result of the agency's increased technical capacity. The next chapter discusses sustainability in more detail.**



## 5. Cost Recovery and Sustainability

### Operation and Maintenance/Equipment Replacement

5.1 Very few juntas understand the concept of depreciation well enough to properly budget for the replacement of their infrastructure. The oldest water tower (by far the most expensive part of each community's water system) visited during the study was about 18 years old. The concrete and underlying steel structure were severely decayed, the tank had multiple leaks, and by the best estimate of SENASA technicians, the structure might last two to three more years before it would have to be demolished and replaced. Juntas that have not planned for such an expense will need to take in many new users at an elevated connection cost or ask members for a special levy in order to build a new storage tank. Neither of these courses of action will be realistic options in many cases.

5.2 Fundamentally, the problem is that juntas rarely set tariffs and fees for connection and disconnection at levels that reflect the true cost of operations. Ideally, the juntas should set tariffs to cover operation and maintenance, debt service, and depreciation. The original tariff levels were based on the communities' ability to pay, as determined by socio-economic studies prepared by SENASA. As operating costs changed, tariffs were supposed to be revised periodically with the assistance of SENASA, but in practice juntas that have not asked for such assistance have not been encouraged to raise rates.

5.3 Meetings with junta directors during field visits revealed that, except for a few entrepreneurial juntas, most hesitate to raise tariffs. In the communities visited during the evaluation, the charge for connecting to the junta system ranged from G.120,000 to G.350,000 for essentially the same service. Whenever they do see the need to raise rates<sup>17</sup> juntas are required to obtain SENASA's approval for the increase. Monthly flat rate tariffs in the villages visited ranged from G.4,000 to G.9,000. Junta directors live in the same village as the users. They have to face the community every time they walk down the street. They know which of their neighbors is ill, out of work, or a widow. Thus, when a junta's directors neither want to strain the ability to pay of the poorest users nor to antagonize their friends and neighbors, the financial viability of the junta is compromised. Further aggravating this situation is many junta directors' lack of understanding that operating revenues must cover both debt service and equipment replacement. Not applying for rate increases and setting the rates too low have very clear consequences. When income is too low to cover depreciation (and often too low to cover both debt service and maintenance and operating expenses), juntas experience increased problems with service delivery. Sometimes they are unable to deliver water consistently to high points on their networks or to maintain uninterrupted 24-hour service.

5.4 Exceptionally entrepreneurial juntas have taken the tack that a strong local organization, capable of delivering a first-class service, is in the community's best interest. Such juntas have raised rates early and often. As a result, a more advanced junta may have a large building, modern

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17. It was not possible to quantify rate changes; SENASA files only keep a record the most recent change. Staff believe, however, that all juntas from RWS I and II have raised their tariffs at least once. SENASA places limits on rate increases because construction costs were subsidized so that the poor would not be charged more than their ability to pay.

office furniture, adequate employees, computerized accounting, additional wells and storage capacity, vehicles, and a large network of users that has expanded beyond the boundary of the original village (often financed by its own revenues). In contrast, juntas that are barely breaking even have one or two part-time employees, small one- or two-room offices in a poor state of repair, a few folding chairs, and shoe boxes full of index cards.

### **Misuse of Water and Excess Consumption**

5.5 The juntas' water systems were designed to provide water for household use (cooking, cleaning, bathing, and toilets) without fully taking into account the supply cost of the water that would be used. The greatest immediate threat to the sustainability of the juntas is excess consumption, commercial use, and misuse of water. Some users keep their taps open and allow the water to run all day, while others wet the dirt streets near their homes to keep the dust down. Such uses overtax water extraction capacity (most systems are based on one well). At high levels of use the real cost of pumping is not covered by the flat rate, which is based on a moderate estimate of per capita household consumption. In some communities visited, waste and profligacy cause daily demands on the system to exceed well, pump, and storage capacity, and prevent system managers from providing all users with an uninterrupted supply at adequate pressure. Clearly the solution is to meter and charge for consumption, and the juntas know this.

5.6 The Bank projects did not include water metering in order to keep per capita costs low and thereby allow wider coverage. Water was therefore billed at a set monthly rate that was usually the same for all users, although some systems had two or three rates based on the sanitary features in use in each dwelling.<sup>18</sup> Many communities still use set rates. The waste problem is compounded for many juntas by a few comparatively large consumers (such as laundries, restaurants, commercial, and government buildings) that pay the same rate as most other users. Without the disincentive of having to pay for what they use, these consumers can put extraordinary burdens on the water supply. To protect its supply in such a situation, a junta may resort to drastic measures. One junta visited during the evaluation was debating whether to cut off water to the regional police station.

5.7 Almost all the juntas' boards of directors want to meter water, but they have difficulty raising the capital to buy the number of meters needed to do the job. And users, happy with the current situation, tend to resist any attempt to make them pay the real cost of the water they use or to finance the cost of improved measurement. Nevertheless, most juntas have begun to purchase and install meters. SENASA's technical staff estimates that 80 percent of the juntas have begun to install meters, but only about 20 have achieved full coverage. Until they reach universal coverage, however, they find it difficult to charge those households with meters a variable tariff based on use while their neighbors, who may be using more water, are still paying a flat rate. Since the juntas often earn no extra income from investments in metering until the entire system is metered, and reserve funds are rarely adequate to complete the job expeditiously, the junta directors visited were quick to voice their regret that the Bank loan did not cover metering.

5.8 Users who fight rate increases have a short memory. Before juntas many families paid four times the current cost of water to buy it from private providers (Table 5.1). A common joke popular with junta directors is that user families never have trouble coming up with money for

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18. For example, homes with just a courtyard faucet would pay a different rate than houses with sinks and flush toilets.

beer, just for water. Monthly tariffs are a fraction of monthly electric bills and represent an estimated maximum of 7 percent of average monthly family cash income in the region.

**Table 5.1: Comparison of Water Usage and Costs**

Type of System	Number of respondents plus reported family size	Daily average per capita water consumption (liters)	Average daily cost for family of five (Guaranies)
Without system (hand carried)	5,313	27	0
Purchased from water carts	105	52	1,380
Connected with private water suppliers	3,013	83	442
Supplied by juntas	19,605	79	314

*Source:* SENASA Department of Operations

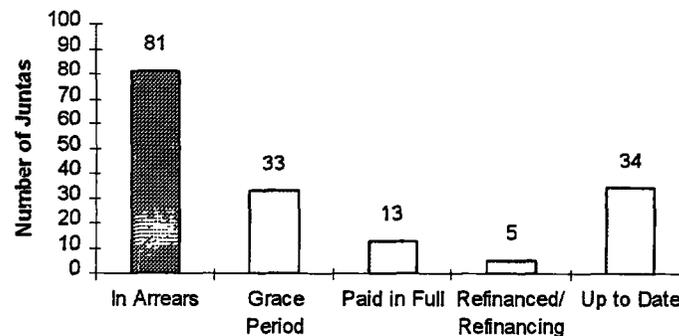
### Economic Benefits of the Rural Water Supply Projects

5.9 An approximate value for the probable minimum ERR was determined during project preparation of RWS IV. The survey of Rural Water Supply Projects I–III was used to estimate costs and benefits that could be expected. The calculations are based on 8,000 households in communities with and without projects. In addition, preliminary engineering designs were done for a sample of 30 representative communities in order to estimate system costs. Economic and financial analyses were carried out to determine the incremental benefit for the three principal project components over a 20-year period: new water supply systems; expansion of existing systems; and sewage systems. The economic benefits were calculated for four different scenarios: cash benefit only; cash benefit plus institutional benefits; cash benefit plus institutional benefits plus consumer surplus; and time savings plus health benefits plus institutional benefits (water components only). Costs were held constant. The ERRs for the first three scenarios are 9 percent, 16 percent, and 94, respectively. In the final scenario the ERR for new systems is 69 percent and for expansion 59 percent. The four scenarios constitute a sensitivity analysis, showing that the project would even be justifiable with an ERR of 9 percent in the base case. The ERR of the second scenario, which takes into account the institutional benefits, is the more realistic one and would give an ERR of 16 percent. The economic justification for the latrine component was based on its low cost and the health hazards it would help reduce.

### System Expansion and Resultant Refinancing

5.10 Most of the juntas' initial water systems have been expanded and improved because of community initiatives. SENASA at times has provided additional equipment and technical assistance, the cost of which has been added to the loan balance. This refinancing is reflected in Figure 5.1, which shows the status of repayment for RWS I–III combined.

**Figure 5.1: Comparison of Juntas in Arrears with Those Up to Date**



### Debt Service

5.11 The juntas have a good record of water bill collection. Accounts receivable for the majority of juntas are only 5 percent to 15 percent of annual sales. Under normal circumstances, juntas shut off water service to customers more than two or three months late in payments—the director decides the number of months. Once water has been cut off, a reconnection fee must be paid when the user's account is up to date. However, a few juntas have high percentages of accounts receivable. Seven juntas once had ratios above 17 percent. In one junta visited during the evaluation, a change of directors and some management decisiveness had been sufficient to solve the delinquent account problem. SENASA normally closely monitors juntas that are having collection difficulties. It also sometimes temporarily intervenes in a junta's administration.

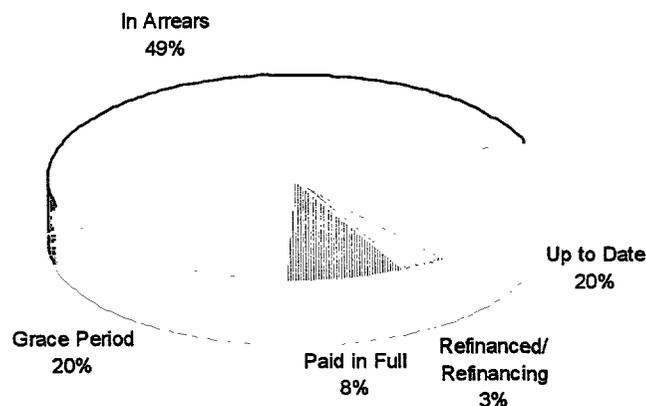
5.12 As noted earlier, virtually all juntas cover their operating and maintenance costs with revenues, but many are unable to keep their debt service current, even though the government provides a subsidy to make the project affordable.<sup>19</sup> About 49 percent of the Bank-financed juntas are one or more months in arrears in their debt service to SENASA (Figure 5.2). This figure significantly overstates the magnitude of the debt service problem, however.

5.13 One hundred sixty-six juntas have had their systems functioning long enough to begin repayment of their loans.<sup>20</sup> Of that number, 13 (8 percent) have already paid in full. An additional 5 (3 percent) are in the process of refinancing their debt because of system expansion, and 34 (20 percent) are up to date. Loans are given for a term of up to 20 years. SENASA estimates the average total payments received by the government from juntas at G.451 million a year, while the accumulated total arrears for the three rural water projects is G.262 million.

19. Communities are required to provide a minimum 22 percent of the investment cost unless agreed otherwise by both SENASA and the Bank (the subsidy is based on SENASA's affordability criteria). Minimum requirements are normally 5 percent in cash; 5 percent in cash or labor, and 12 percent in debt.

5.14 The only way a junta in a remote village several hours from SENASA's office can make a payment is to send a director with the cash on a bus to San Lorenzo. The cost and inconvenience of such a trip is an incentive to letting arrears accumulate or waiting until other pressing business arises before sending a commission to the city. SENASA staff claim to have developed several mechanisms to overcome this problem (such as using local savings and loan cooperatives as collection agents). They will be experimenting with these mechanisms in 1998. This has not been a high priority for SENASA, however, because the funds go directly to the central government, and repayment (or the lack thereof) are of little immediate consequence to the agency.

Figure 5.2: Status of Juntas' Debt Service



### Sustainability of SENASA's Participation

5.15 The ongoing technical support for new juntas and, to a lesser extent (because of the volume of work projected under RWS IV), follow-up for existing ones is assured because SENASA's activities are funded by ordinary budget processes.<sup>21</sup> SENASA has been able to finance its current operations and its construction program without financial difficulty out of the government's contribution, proceeds from the various Bank loans, and grants from other foreign

20. At least 12 percent of the total capital expenditure is converted into an interest-bearing loan. The juntas repay the loan in equal monthly installments over 15 to 20 years, with interest of 9.6 percent after a grace period equal to the construction period plus six months.

21. SENASA's administrative and operating expenses and investment requirements in water supply and sanitation in rural areas are financed by the government's general budget for the Ministry of Public Health. Annually, SENASA's allocation is submitted to the Budget Department of the Ministry of Finance for approval and presentation to parliament.

and local entities. The capital subsidy for system construction can be as high as 78 percent of total investment cost. It is unlikely that new juntas in villages not served by any water system can be fully self-financing and still provide water to low- and middle-income rural families.

## 6. Conclusions and Recommendations

### Conclusions

6.1 Bank support for the rural water subsector in Paraguay has made a significant difference. The achievements of the two completed (and the third nearly complete) projects are considerable. The projects, along with other smaller programs, reduced the deficit in rural water supply, increasing water coverage to about 20 percent of the 1997 rural population from the initial level of less than 1 percent. Health impacts were largely as anticipated. As a result of project activities, living conditions in the rural areas have improved substantially, infant mortality is down, waterborne disease incidence is lower, and the status and lives of women are better.

6.2 The rural water infrastructure is in place and functioning. Moreover, the institutional development achievements are impressive. Hundreds of juntas have been established in rural villages, and their members and directors have been trained to operate a reasonably complex water delivery system. They keep the piped network operational, they ensure the functioning of the pump(s) and water storage facilities, and hold regular meetings. Almost all juntas have expanded their original operation, taking in new members and providing service to a broader pool of beneficiaries without additional Bank support.

6.3 Of equal importance is the ability of the juntas to handle the administrative tasks inherent in operating a commercial water system. They send out bills, keep account books, manage employees, and (more or less) meet their debt obligations. All of this takes place in a participatory and democratic way. Boards of directors routinely change members, and the committees are continually strengthened by the growing number of ex-directors within the membership.

6.4 How well is it all working? It borders on the amazing that not one junta has gone bankrupt, disbanded, or ceased providing services. Certainly, even on a worldwide basis, there are few examples of 100 percent success creating rural organizations capable of maintaining the intended benefit stream. The tasks these organizations perform are difficult, and they are in areas in which none of their members had previous experience. Equally noteworthy is what has happened to the price of water. It has dropped from an unaffordable level (US\$8/m<sup>3</sup> from water carts) to a price that all but the poorest of the poor can afford—capital costs are subsidized, but this is not unusual for rural water supply schemes. SENASA has grown to meet the challenges inherent in a work program that has expanded steadily. The loans have included substantial technical assistance to SENASA for strengthening its managerial capabilities and helping it to better organize the communities and design improved operation and maintenance procedures for the water systems. These activities have clearly been beneficial. In addition to creating new juntas and preparing directors to run them, SENASA has provided indispensable follow-up assistance in such key areas as monitoring of water quality, troubleshooting pump and system problems, and administrative support over a growing geographic area.

6.5 The approach used in Paraguay is well worth applying in other countries where similar conditions prevail. There is no doubt, however, that all the participants in the project have been more enthusiastic about the potable water aspects of the work, and that what has been done in sanitation was something of an afterthought (often occurring because NGOs or other donors provided extra assistance).

6.6 Although SENASA's community promotion activities have focused on organizing the juntas and developing their commitment to participate in the project from initial planning and financing to fostering their capacity for the subsequent operation and maintenance of the systems, the manner in which this is done is slowly changing. The demands of the new committees and those in formation increasingly tax the implementation capacity of SENASA. As a result, existing organizations are beginning to help each other, creating new associations to provide needed services and increasingly finding private sector assistance on their own to cope with simple problems. The creation of the Association of Juntas as well as the Cooperative of Juntas signify the subsector is in good shape. It is weaning itself from its near-total dependence on SENASA and learning to take care of itself.

6.7 The relationship between the Bank and the client has been good. The expansion in rural water supply and sanitation coverage would not have been possible without Bank participation. Senior SENASA staff had only positive recollections of their interactions with the Bank over the years.

### Factors of Performance

6.8 What made the Paraguay intervention a success?

- *Continuity of staffing.* The rural water supply loans were more dependent than many Bank projects on a series of complex events taking place in hundreds of villages in more or less the same way. A certain constancy of vision facilitates such an undertaking. Much of the success achieved is doubtless because the rural water projects have not changed task manager very often. Continuity of staffing permitted Bank-client relationships to develop a deeper understanding over a prolonged period. The lessons of success have been learned, and the Bank has been able to work with SENASA to see that once problems are identified, they are systematically dealt with.
- *Widespread rural electrification.* Near-universal rural electrification permitted the projects to use extremely reliable electric pumps. One of the greatest problems rural water supply projects face in most countries is tied to the maintenance, repair, and parts supply associated with gasoline- and diesel-powered pumps or handpumps.
- *Timely educational and training inputs.* The technical preparation of the juntas and the diffusion of potable water-related health benefits were facilitated by timely and coordinated use of training. Although the effort was large-scale, the self-evaluation workshop participants highlighted the need for even greater efforts in this area, a finding that supports OED evaluation results in other countries.
- *The projects built on the country's social and cultural traditions.* The people of Paraguay, like those of several other Latin American countries, have a long tradition of working together for the good of the community. Working on committees for village betterment is a part of rural life. Most villages have such committees around their schools, the church, and certain sports. Thus, at least some of the interpersonal challenges of working together on juntas were familiar. The fact that SENASA charges for its assistance was both culturally astute and, in a way, supportive of long-

standing government practice of not fostering dependency.

- *Local ownership of infrastructure.* The juntas owe some of their sustainability and permanency to their ownership of significant and visible property. They usually own at least two plots of land, one for the office and at least one other for the well, water tank, and other structures. The juntas not only provide an essential service that is highly prized by the entire village, they are also visible to the community they serve and offer a place where users unhappy with any aspect of the service can go and complain.

## Recommendations

6.9 Despite the demonstrable benefits of the water program, several areas require further attention.

- *Tariffs need to be set at sustainable levels.* The strongest and weakest juntas are separated by a large gap. The biggest difference between them is income, a function of tariffs. While the juntas are in the business of providing an affordable service to their members rather than trying to make a profit for their stockholders, too many juntas do not understand the full cost of the service they provide. Ultimately it is in the interest of their members to replace expensive infrastructure (such as water towers) before the end of its useful life and not after. Juntas that cover the full cost of water supply ultimately provide better service to members.
- *Weak juntas need additional administrative help over the short term.* A junta with a computer costs less to run in the long term (boxes full of paper and file cards are tedious to handle, and important documents get misplaced). Computers also can make projections and otherwise provide information of importance to system managers and directors. The latter often have little time to spend in the juntas because they are volunteers.
- *Water meters should be covered in the loans for new juntas, and existing juntas that are up to date with their payments should have access to credit sufficient for universal metering of household use.* Every junta visited stressed the importance of starting out with meters. Even though the per capita costs appear to be very high if meters are included, those costs could be recovered very quickly because of the income the meters generate. Once system users get used to not paying the real cost for the quantity of water they use, it becomes extremely difficult for directors to make needed changes. The waste and misuse of water will only stop when all water is measured and paid for. But if water cannot be measured and charged for, it is too difficult for the juntas to raise the money to buy meters.
- *SENASA should be provided with technical assistance in knowledge management.* A persistent weakness in SENASA is its inability to get information to those who need it. Monitoring is taking place. The juntas produce monthly updates on work in progress, but no unit in SENASA collects and systematizes that data. As a result, most staff members keep their own files, and nobody knows who is keeping which file. This inevitably leads to coordination problems. An activity that should be

prioritized as highly as improving accessibility to information is improving the flow of information. Information management support is needed. Staff complained that information and publications sent by the Bank and other institutions never reach field staff. Information does not flow smoothly from the field to the top (or to Bank missions), so decisions sometimes have to be made without good information on what is happening or what is needed on the ground. And information does not flow horizontally, so SENASA staff do not know what their colleagues are doing, and they often are surprised to find them visiting the same junta on the same day.

- *SENASA's evaluation capacity needs to be increased.* The self-evaluation workshop conducted for this study was the first such event in almost 20 years of implementation. Staff have learned how to run such workshops now, and they should be encouraged to hold more of them. Self-evaluation activities need to go beyond required Bank reports, and they need to involve field staff and beneficiaries.

### Summary of RWS Achievements

Project Objective	RWS I (Loan 1502-PA)		RWS II (Loan 2014-PA)	
	Projected	Actual	Projected	Actual
A. Construct and extend water supply systems	Provide safe water to about 63,000 inhabitants by constructing and extending water supply systems in 42 rural communities.	Constructed water supply systems serving 187,490 people in 47 rural communities.	Construct or extend existing water supply systems in 49 rural communities, serving about 60,000 people.	Extended water systems serving 94,765 inhabitants of 51 rural communities.
B. Provide adequate individual waste disposal solutions	Execute a pilot project for individual waste disposal solutions, including approximately 4,500 tile fields.	Installed 500 wet latrines with tile fields.	Install about 2,000 sanitary units (consisting of a shower, lavatory, and laundry facilities).	Completed 2,000 sanitary units.
	Provide 2,000 sanitary units (small units with shower, toilet, lavatory, and laundry facilities).	Completed 2,000 sanitary units; sanitation conditions were improved.	a. Construct about 2,000 latrines. b. Connect 23,710 households. c. Provide 732 public standpipes.	a. Completed 2,000 latrines. b. Connected 18,953 households. c. Constructed 37 public standpipes. d. Built 3 non-perforated wells.
C. Strengthen managerial and operational capabilities	Acquire miscellaneous construction equipment and shop tools.	Fully completed.	Procure equipment and tools for regional laboratories, well drilling operations, community repair shop, and construction supervision	
D. Technical assistance	Conduct a technical assistance program for SENASA in management, operations, and financial administration.	Partially completed. The capacity of SENASA to mobilize community participation was developed under the project.	Provide technical assistance to SENASA in project management.	Upgraded staff performance in project management and operations.
E. An education and promotional program in basic public health	Carry out an education and promotional program in basic public health during preparation and execution to ensure that project benefits are fully realized.	a. Carried out. This affected health conditions; waterborne diseases have decreased. b. After completion, each community took possession of its system and inherited responsibility for its operation and maintenance.	Provide health education programs.	Highly satisfactory both in promoting community participation in the project and developing awareness of hygienic practices and of protecting water resources from contamination.

Project Objectives	RWS III (Loan 3519-PA)		RWS IV	
	Projected	Actual	Projected	Actual
Construct and extend water supply system	Build water supply systems in about 170 rural communities, benefiting about 230,000 inhabitants.	a. Constructed water supply system in 177 rural communities, benefiting 119,060 people. b. Constructed 10 public standpipes.	Provide water and on-site sanitation services to 330 new systems, benefiting about 310,000 inhabitants.	
Provide adequate individual waste disposal solutions	Provision and improvement of on-site sanitation systems for about 250,000 inhabitants.	Connected 23,812 households.	Construct sewage systems in about 10 rural communities and 21,500 latrines to serve about 40,000 inhabitants.	
	Provide water supply and sanitation systems to about 20,000 of the dispersed rural population and indigenous settlements through low-cost appropriate technologies.		Expand 10 existing systems and build 35 new systems for the indigenous and dispersed rural population, covering 33,000 inhabitants.	
Technical assistance	Technical assistance program to assist and train SENASA implementation techniques and development of an educational and project cost.			
	Institutional improvement for O&M.		Create an association of juntas in selected departments of the country, for technology transfer and support among juntas, including training program for the technical staff.	
			Pilot the promotion of the role of the private operators ( <i>aguaterias</i> ).	
			Prepare a National Rural Strategy and Program for Water Supply and Sanitation.	

## COMMENTS FROM THE BORROWER

**THE REPUBLIC OF PARAGUAY****Ministry of Health and Social Welfare**

S.G. No. 513

Mr. Roger Slade  
Manager, Sector and Thematic Evaluation Group,  
OED, World Bank

Asunción,  
May 14, 1998

Dear Mr. Slade:

I am pleased to write in response to the draft Impact Evaluation Report on Rural Water Supply and Sanitation Projects I, II, and III.

At the same time, I provide below a series of comments that might help in reaching valid conclusions with regard to the experiences gained from these projects.

As regards negative impacts, the supply systems still operated by the longest-established of the *juntas de saneamiento* (officially recognized sanitation committees) have now been in service for 20 years, and -- because of ground saturation -- the wastewater is now flowing into streets, creating a health hazard and making it urgently necessary to construct sewerage systems.

It is also to be noted that water supply systems have a large positive impact on socioeconomic life. A recent study (by Facetti and Vidovich) refers to the considerable savings to be gained in the form of health and increased output through the installation of such systems in intermediate and small communities. Parents avoid both the costs incurred as a result of the ill health and suffering of their children when the latter are affected by water-borne diseases, and the time lost from productive work when they are obliged to be with sick or convalescent children who are admitted as inpatients at clinics.

It is very important that environmental epidemiology be included in the Fourth Project, so that evaluation of its impact on health can be more effective and real.

A point to be noted is the considerable degree to which women have participated in the formation of the *juntas* since their inception, by taking part in surveys and helping construct and manage the systems. This process has also provided motivation for education at household level, raising consciousness and instilling a proper sense of the value of water.

In many cases, the construction of a water supply system has also served to bring family members together, in addition to strengthening ties among neighbors, and to

establish common links that open the way to other initiatives, promote community action, and make it likely that the systems will become sustainable.

As regards the genuine concern expressed over pricing in rural areas, the problems this raises can only be solved by defining policies to govern the sector and its tariffs and by restructuring the sector, including introduction of a regulatory and pricing framework. These steps have now been proposed in the *Análisis Sectorial de Agua Potable y Saneamiento del Paraguay* (“Water Supply and Sanitation Sectoral Analysis for Paraguay”), and are expected to be implemented shortly.

Similarly, it should be noted that the health decentralization policy implemented by this Ministry has considerable significance for municipalities and *gobernaciones* [governorates]. Its implementation began very recently with the promulgation of Law 1032/96, establishing the National Health System, and Regulatory Decree No. 19,966 of February 17, 1998, governing local health decentralization, citizen participation, and self-management of health care.

It should also be noted that the *juntas* provide the first example ever of a decentralized water-supply system in Paraguay. There is, however, a long tradition of such institutions, and we believe the time has come to take another step forward by strengthening the *juntas* in their task of managing sanitation systems (i.e. sewerage systems, sewage treatment, disposal of solid waste, etc.).

Each of the World Bank’s projects has served to strengthen SENASA’s management capacity for project preparation, implementation, and monitoring, directly influencing the Service’s staff by providing them with the necessary skills and experience to deal efficiently and capably with other challenges, such as the Fourth Water Supply and Sanitation Project (which will include the construction of 330 new water-supply systems and 10 sewerage systems, the extension of 10 existing systems, and the construction of 35 systems for indigenous communities).

Because of the success of IBRD projects I, II, and III, the National Government is committed to continue strengthening and supporting SENASA, so that the objective of providing water supplies and sanitation for all can be achieved as soon as possible.

I thank you for this important Evaluation Report, and trust that these comments will prove useful to your Department.

Sincerely,

/s/ Dr. Andrés Vidovich Morales,  
Minister