UNDP-World Bank
Water and Sanitation
Program

Rural Water Supply & Sanitation in Bolivia:

From Pilot Project to National Program

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Foreword

Since 1991 the water and sanitation sector in Bolivia has undergone radical reform. The Yacupaj pilot project described in this report was both a manifestation of this reform process and a contributor to it. The project led to a large investment program, PROSABAR, expected to benefit more than 800,000 people throughout the country. This study documents the results of the pilot project and the path to a national program.

Within the development community (including the World Bank) there is an ongoing debate about moving from an old blueprint-type project planning process to a "new" four-stage project cycle: listening, piloting, demonstrating, and mainstreaming. The Yacupaj-PROSABAR experience documented in this report is one of a new generation of World Bank projects that are translating this new project cycle approach into practice.

The Yacupaj-PROSABAR approach is client oriented in several respects. It ensures that investments reflect consumer demand, and it focuses on the borrower, not the requirements of the assistance agency. It emphasizes institutional development and capacity building as a central goal rather than as a side component of the project. It encourages and builds on stakeholder participation to ensure project ownership. And it embodies a learning culture in which adjustments are made as lessons emerge from initial experience in the project.

John Briscoe
Chief
Water and Sanitation Division

Executive Summary

Bolivia has a long history of building water and sanitation systems in rural areas. In constructing these systems, project planners have focused almost exclusively on their technical merits, with little consideration given to economic efficiency or sustainability of services. The basic premise underlying these projects has been that economic demand for water services is too low for the rural population to be willing to pay for the services provided. Projects have therefore been primarily supply driven, with community "needs" being determined by officials from a central government agency.

The Yacupaj project was initiated as a pilot project in the Department of Potosi in 1991. Its objective was to design and test strategies for delivering services to the dispersed rural population of the Altiplano and to use these lessons to prepare a national project. The project built on experiences in the numerous countries in which the UNDP-World Bank Water and Sanitation Program was active and introduced innovative approaches to sector development based on the results of the International Drinking Water Supply and Sanitation Decade of the 1980s. These new approaches were based on the following principles:

- Community participation at all stages of a project is essential to its sustainability.
- Nongovernmental organizations and the private sector are able to implement rural water and sanitation projects effectively and efficiently.
- A wide range of technologies and adequate financial policies are essential to project success.
- Training in operations and maintenance and sanitary education are crucial project components, and operations and maintenance are highly dependent on project design and implementation.

The Yacupaj project also introduced an adaptive approach and encouraged stakeholders to develop project rules and processes.

The results of the Yacupaj project have been essential in the preparation of the IDA-funded *Proyecto de Saneamiento Basico Rural,* or PROSABAR. But scaling up the pilot project to a national program has presented new challenges, not only because of the weaknesses of national sector strategies and policies, but also because of the need to ensure ownership of the

project by a much larger number of stakeholders. The PROSABAR project greatly benefited from the community-level implementation process developed by Yacupaj, which included strategies for addressing economic demand by negotiating levels of services and financial options with communities, and supporting sustainability through the application of training and hygiene education programs. The larger project had to be defined in a broader institutional, financial, and political context, however. Complicating the process was the fact that during project preparation Bolivia was undergoing major reforms, including the creation of rural municipalities, decentralization to departmental governments, and the restructuring of the executive branch.

The Yacupaj project provided important lessons, from which PROSABAR benefited:

- Poor beneficiaries are willing to select and make a substantial contribution to water and sanitation services; economic demand for services does exist.
- Cost reductions can best be achieved through incentives rather than through strict and expensive administrative control mechanisms.
- Social and community development processes need to balance a participatory approach with clear objectives and outputs.
- Efficiency is significantly increased if community-level projects are grouped together for implementation.
- Although communities are willing to assume responsibilities for operations and maintenance, they require additional backstopping to achieve long-term sustainability.

A key lesson of the Yacupaj project was that government participation in rural water and sanitation service expansion in Bolivia requires a sector-specific approach in order to strengthen policies and build institutional linkages between communities, local governments, sector agencies, and private and nongovernmental actors.

Before PROSABAR, the government had done little analysis of the costs of service delivery, or the sustainability of the investments it had made in the sector. The Yacupaj experience brought more rigor to the analysis of costs by providing realistic figures and encouraging other sector actors to do the same. This financial analysis had important implications for the sector, as its results not only determined financial policy for PROSABAR but were also applied as national policy for the sector.

The lessons documented in this report are applicable to the development of large-scale rural water and sanitation projects in general. The overarching lesson is that demand-driven and sustainable investments require a coherent set of project rules that constitute the framework for all activities. These rules determine such critical elements as financial policy, eligibility criteria, levels of service, and responsibility for service delivery and operations and maintenance. The rules must create the right incentives to ensure that beneficiaries choose services they want and for which they are willing to pay. This study offers an illustration of how these rules can be tested through a pilot project and developed through the preparation of a large investment program.

Part 1: Introduction

The main objective of this case study is to document the results achieved by the Yacupaj pilot project and the process followed in the preparation of *Proyecto de Saneamiento Basico Rural* (PROSABAR), a national program. The case study also assesses the contribution of both projects to reforming the rural water and sanitation sector in Bolivia.

The case study is divided into three sections. The first section analyzes how the institutional arrangements established in the Yacupaj project generated a set of behavioral incentives that led to demand-driven investments and long-term sustainability. It describes the project's rules, processes, and implementation strategy and presents results on the impact of the project at the community and institutional levels. In addition, it shows how working through nongovernmental organizations (NGOs) and existing agencies led to the institutionalization of the project.

The second section focuses on how PROSABAR integrated the lessons from Yacupaj in formulating a national sector policy (figure 1.1). It documents how PROSABAR established the project rules and institutional arrangements, including the eligibility criteria, technical options, and financial policy. The ways in which PROSABAR tackled new challenges during the scaling up process—including the new role played by the municipalities and the absence of a national sectoral policy leading to conflicting approaches to the delivery of rural water supply and sanitation services—are also examined. The third section draws lessons for project planners and World Bank task managers. The experience with Yacupaj and PROSABAR is significant not just because it reformed the water and sanitation sector in Bolivia, but because it provides a model for implementing water and sanitation projects in rural communities. This model is the project's contribution to the sector.

Figure 1.1 The model for scaling up

Yacupaj: The pilot project

Testing rules and policies at the micro level:
- Demand-based approaches
- Social interventions
- Use of appropriate technologies
- Financial policies
- Institutional backstopping

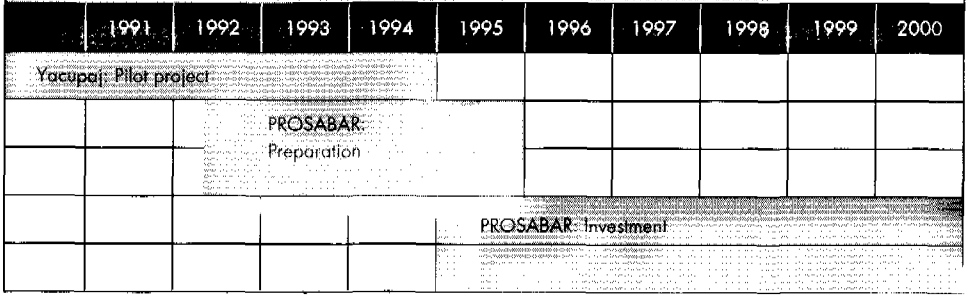
Beneficiaries: 61,000 rural community residents
Project cost: US$2.8 million

PROSABAR: The national program

Implementing national policy for sustainable large rural water supply and sanitation investment throughout the country

Beneficiaries: 800,000 rural community residents
Project cost: US$48 million

Investment timeline



Key

Ongoing activity
Phase in or out

Part 2: The Pilot Project

Faced with a severe economic crisis during the mid-1980s, Bolivia adopted a far-reaching economic program aimed at stabilizing and restructuring the economy. The economic growth achieved since the crisis has not led to a significant reduction in poverty, however: according to the National Statistical Institute, about 70 percent of the population lived below the poverty line in 1992 (table 2.1). In the water and sanitation sector, Bolivia has the lowest service levels in South America, with only 58 percent of the population receiving water services and only 43 percent receiving sanitation services, according to the 1992 census.

In rural areas, where 42 percent of the population lives, only 24 percent of the population is served by safe drinking water systems and only 17 percent has access to adequate sanitation. Most of those served in rural areas live in larger settlements; most people living in communities of less than 250 inhabitants (representing 80 percent of the rural population) lack adequate water and sanitation facilities. Even in small towns with water supply systems, service quality is poor and sanitary standards are not enforced. Sewerage systems are unreliable, and sewage is often discharged into the natural drainage system without any control. Throughout the country, most water sources are polluted.

The dismal state of water and sanitation services is responsible for endemic waterborne diseases, which remain the most frequently reported and widespread illnesses in the country. Intestinal disease is the second largest cause of death among all age groups and the leading cause of infant mortality, which remains very high in Bolivia (75 per 1,000 live births). In rural Bolivia lack of adequate water supply facilities forces most households to devote substantial amounts of time to fetching water from distant sources—a burden that falls mainly on women and children.

Project Design

In 1990, when the pilot project was designed, the rural water and sanitation sector in Bolivia faced numerous constraints. Severe financial constraints limited the size and scope of investments. Institutional responsibility for the sector was unclear, with activities divided among the

Table 2.1 Socioeconomic indicators for Bolivia and Potosi

Indicator	Bolivia	Potosi
Population	6,420,792	645,889
Rural population (percent)	43	66
Population density (population per square kilometer)	5.8	5.5
Population growth rate per year (percent)	2.3	–0.1
Share of households below the poverty line (percent)	70	80
Per capita annual income (US$)	804	434
Life expectancy (years)	59	52
Infant mortality (per 1,000 live births)	75	118
Illiteracy rate (percent)	20	38
Access to electricity, water, and sanitation (percent)	54	40

Ministry of Health, the Ministry of Urban Affairs, the Ministry of Agriculture, and the Regional Development Corporations. There was little coordination between the activities of the more than 400 NGOs and other agencies that were active throughout the country. Government agencies involved in the sector had a tradition of directly constructing services themselves, with little private sector involvement. Finally, Bolivia lacked a sector policy that determined which communities would be served first, how much subsidy the government would provide, and how the responsibility for operations and maintenance of the systems would be assigned.

The Yacupaj project was conceived as a pilot project to develop and test implementation strategies to provide water supply and sanitation services to dispersed rural communities in the Altiplano. Yacupaj means "for the water" in Quechua. The project was implemented in four provinces of the Department of Potosi between 1991 and 1994 at a cost of US$2.8 million. It was funded mainly by the Government of the Netherlands. The UNDP-World Bank Water and Sanitation Program (the Program) served as the executing agency. The Regional Development Corporation of Potosi served as the implementing agency.

The Yacupaj project operated in more than 520 communities, training rural teachers, health workers, masons, and water system operators. The project installed water systems, handpumps, and sanitation facilities that provided 31,000 people with water services and 30,000 with sanitation services.

The project design was based on the following principles, which emerged from numerous projects implemented by the Program in Africa, Asia, and Latin America:

- Community responsibility and participation in all stages of project planning, construction, and operations and maintenance is essential. Women should be involved with the project at every stage.
- Low-cost technologies (handpumps, gravity flow systems, ventilated improved pit latrines) should be promoted to make facilities affordable to low-income communities.
- Cost-recovery mechanisms that are realistically geared to family incomes should be used to ensure sustainability of the services.
- Water supply and sanitation services should be linked with health, hygiene, environmental education, and income-generating activities.
- Planning and implementation should be executed by local and national people to the greatest extent possible.

- Local capacity to deliver services, particularly by NGOs and the indigenous private sector, should be strengthened.
- In-service and more formal types of training should be used to develop sector agency capacities.

Project Rules

During the first nine months of the Yacupaj project, staff focused on developing the rules for project implementation: community selection criteria, technical design criteria, financial policy, and the responsibility for operations and maintenance. These rules were based on the following three objectives:

- to improve service coverage and the effective use of the services by the beneficiaries;
- to strengthen existing institutions at the community, provincial, and departmental levels; and
- to develop a model for replication in other areas of the country. The goal was to design rules that would give families choices.

The staff built in measures to ensure a flexible and adaptive approach to the project. All staff and representatives of counterpart agencies met annually to analyze the rules and processes and agree on modifications. They produced a detailed strategy document that was distributed to all project staff, and modified it twice during the four years of implementation. Simple promotional flyers were distributed to communities throughout the region outlining eligibility criteria and rules for participation in the project.

Community selection criteria

Most inhabitants of Potosi live in very small communities that are isolated by difficult terrain, making the population difficult to reach. Faced with such a dispersed population, Yacupaj decided to group communities into subregions to reduce administrative costs. The project delegated responsibility for community selection to three agencies, which chose subregions based on their institutional presence and community demand for services. Creating these subregions improved efficiency in project implementation, monitoring, and supervision, and strengthened the capacity of the local private sector to deliver technical support and spare parts on a commercial basis. All communities in the subregions with populations of 50–250 inhabitants were eligible to participate if the community asked to participate, if the beneficiaries accepted the financial policy of the project and assumed responsibility for long-term operations and maintenance, and if service provision was technically feasible.

Technical options and levels of service

In order to reduce costs and ensure maintenance by users, the project promoted the use of technologies that were within the technical and financial reach of the community (table 2.2). The project offered technical options that were appropriate for the physical and hydrological conditions of the area and took into account the degree of dispersion between communities and the large distances between houses in those communities.

Project staff promoted these technologies by constructing demonstration facilities of handpumps and latrines in each province and producing a variety of educational materials to outline the options. Project staff presented at least two technical and their corresponding service level options to each community and guided the decisionmaking process with cost estimates. Decisions on latrines were made on a household basis. Communities chose to participate in the project and selected water and/or sanitation services based on a full knowledge of costs.

Financial policy

The Yacupaj financial policy was a critical element of the project's success. Although the project served Bolivia's poorest residents, more than 50 percent of its funding was provided by the community—a significantly higher level of

contribution than that of any previous water and sanitation project in the country.

The financial policy had three main objectives:

- to ensure a sense of ownership by requiring the community to contribute in both cash and kind to investment cost,
- to lower cost by using appropriate technologies in order to reduce government subsidy and extend coverage to more people, and
- to ensure that the cost of investment and operations and maintenance was within the community's financial capacity. The financial policy was based on socioeconomic and willingness-to-pay studies of a sample of communities (table 2.3).

Since the project adhered to a policy of strict financial control through standard design features and fixed costs, no per capita cost ceilings were established. Communities chose from a menu of technical options and specific costs based on a percentage of investment cost. The project also placed restrictions on the length of gravity-fed water distribution networks.

The financial policy for latrines was modified during the third year of project implementation in response to demand for more latrines. The project agreed to add more latrines to its implementation plan, but increased the community contribution from 30 to 50 percent of investment cost. Demand for additional latrines continued even after the increase.

Responsibility for operations and maintenance

The project gave beneficiaries full responsibility for operation, maintenance, and replacement of facilities, and insisted that communities agree to this responsibility before construction

Table 2.2 Technical options and corresponding levels of service

Type of service	Technical option	Levels of service
Water supply Spring protection	Protection alone Distribution system	Standpipe at source Public standpipes House connections
Dug well and handpumps	Direct action Yaku pump Rope and washer pump Bucket pump Deep well with IMIII pump	Communal pump Family-level pump
Sanitation Latrines	Ventilated improved pit	Family (single pit) Communal (double pit)
	Pour-flush	Family (single pit) Communal (double pit)

Table 2.3 Breakdown of responsibilities for the Yacupaj project

Responsibility	Community's contribution	Yacupaj's contribution
System design	Choice of level of service	Technical assistance
Local materials (sand, rock)	100 percent	0 percent
Other materials (pumps, pipes)	30 percent of cash cost 100 percent for house connections	70 percent of cash cost 0 percent for house connections
Skilled labor	Choice of contractor	100 percent

began. The project provided training to local masons and water system operators in simple operations and maintenance tasks. Ownership of the facilities was "officially" transferred to the community, although the assets were not formally registered by the government or community.

The project worked closely with provincial stores to encourage them to sell materials and spare parts. These stores now regularly buy equipment on a wholesale basis from manufacturers, and community members rely on this inventory to maintain their systems. Since the project concluded, communities have been able to rely on their own resources or on the private sector to undertake operations and maintenance.

Project Implementation

Responsibility for implementing the project was divided among the different stakeholders. A steering committee met every three months to review project progress and approve new work plans. The committee was made up of representatives from the National Director of Water and Sanitation (DINASBA), the National Directorate of International Cooperation (DICOPRE), the Netherlands Technical Mission in Bolivia (MCTH), the Regional Development Corporation of Potosi (CORDEPO), the Potosi office of the Ministry of Health (MSP), the United Nations Development Program (UNDP), and the Program.

A program coordination unit based in La Paz focused on building consensus in the sector, applying lessons from Yacupaj at the national level, and supporting national sector policy development. The unit's international staff held regular seminars to exchange ideas and experiences on global issues in the sector. Participants included representatives of the national and departmental government as well as the U.S. Agency for International Development (USAID), the United Nations Children's Fund (UNICEF), CARE, and local NGOs.

At the departmental level, a project implementation unit was formed in Potosi. This unit was responsible for designing the project rules and implementation strategies, technical assistance, training of provincial staff, production of training materials, supervision of provincial implementation, and monitoring and evaluation. The unit included a project director and a subdirector, a social advisor and two assistants, a technical advisor and two assistants, a monitoring and evaluation assistant, an administrator, and support staff.

The project worked with one intermediary in each of the three provinces: two NGOs and one integrated regional development project. Each intermediary hired a director, a community development advisor, a sanitary engineer, a hydrogeologist, five to seven extension workers, an administrator, and a driver. The provincial director and administrator were contracted directly by the Program during the first two years; subsequently, these responsibilities were assumed by the intermediary. The intermediaries were selected on the basis of their institutional presence in the province and their willingness to pursue an experimental approach to the project (box 2.1).

The terms of the contracts with the intermediaries were elaborate and required strict adherence to the Yacupaj rules and implementation strategy. The intermediaries were, however, encouraged to become part of a "pilot process" and motivated to be creative and analytical. They were asked to prepare quarterly and annual budgets, and to analyze their workplans for review and approval by the steering committee.

Implementation model

The project's implementation model at the community level depends on two main assumptions (figures 2.1 and 2.2). First, it assumes that the project is a temporary provider of technical assistance and finance; by means of contracts, it delegates responsibility for project implementation to intermediaries and private enter-

Box 2.1 The Yacupaj intermediaries

The Yacupaj strategy was to work through existing institutions. At the provincial level, the Yacupaj project formed strong partnerships with three agencies in Potosi to implement the project:

Instituto Politécnico Tupac Katari (IPTK)
Created in 1975, IPTK is an NGO that works in the province of Chayanta to help rural communities develop agriculture, microenterprise, infrastructure, health, and education facilities. The Ministry of Health has delegated responsibility for management of all public health facilities and personnel in the province to IPTK. At the community level IPTK works through farmers unions and seeks community participation in its projects, mainly through the provision of labor. It has more than 200 employees and has received long-term funding from European donors. Before working with Yacupaj, IPTK did not include water and sanitation in its work program.

Centro de Investigación y de Apoyo Campesino (CIAC)
CIAC has worked in three provinces in the Department of Potosi since 1988. By working through traditional community leadership structures, CIAC helps improve agricultural production, promotes cultural events, and provides legal assistance. It has experience in implementing water and sanitation projects other than Yacupaj. It receives funding from European donors and international NGOs.

Proyecto Cotagaita San Juan del Oro (PCSJO)
PCSJO is a government-executed rural development project that began in 1985. It implements nine components of the project, ranging from roads to agricultural credit and erosion control. Before working with Yacupaj, PCSJO followed a technically oriented approach to development with little emphasis on beneficiary participation. It had limited experience with water and sanitation projects before Yacupaj.

prises. Second, the model assumes that demand is generated in communities and that they request improved water and sanitation facilities. The intermediary and rural promoters help communities meet demand by planning their works, purchasing materials from local stores, and hiring masons to assist with construction.

Training project staff

The Yacupaj strategy requires that the implementation teams consist of multidisciplinary staff members. Engineers and technicians must know how to negotiate service levels with communities and train system operators, and social staff must be familiar with latrine siting, construction, and the operations and maintenance of the systems.

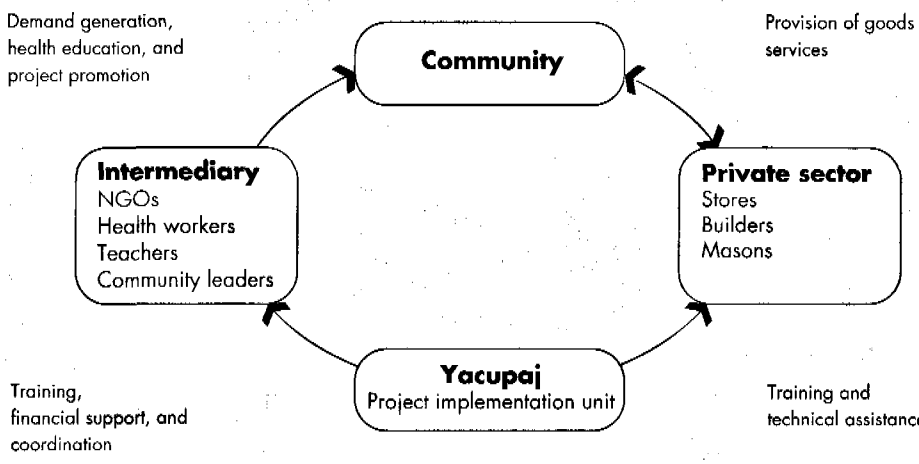
All project staff participated in three one-week training events held at the provincial level. The fieldworkers then replicated this training for rural promoters (teachers, health workers, and community leaders). In addition, project staff were trained on a systematic basis through short-term consultancies and visits by the staff of the Potosi office (table 2.4).

Training at the community level

The project adopted the SARAR methodology for training at the community level (box 2.2). This method develops the capacity to evaluate, select, plan, create, organize, and undertake initiatives by encouraging collective responsibility for decisions and by respecting the cultural, social, and economic environment of the community. It pays special attention to the development and use of support materials (visual and audiovisual educational techniques, sociodramas, comic books, and so on). These materials can play an important role in the education process.

The Yacupaj experience showed that the application of participatory methodologies must be balanced with a clear understanding

Figure 2.1 Implementation model



of expected results. Participatory exercises should focus on helping communities determine their development priorities, implementing the project, and acquiring new skills for the sustainability and effective use of facilities. After two years of project implementation it became evident that coherent objectives and activity and performance indicators were required to monitor the activities of the field workers to ensure a result-oriented approach. Boxes 2.3, 2.4, and 2.5 illustrate how the implementation model was executed in different communities.

Technical options

Each community was offered a choice of technical options and a range of possible service levels. The project originally allowed for 1,250 wells with handpumps and 1,250 latrines, but in response to demand expanded the range of choices to include more handpump options, as well as gravity systems. It also increased the number of latrines. Communities chose between hand-dug wells with handpumps and gravity systems, and determined the number of beneficiaries per water point. Project staff developed visual materials and built demonstration facilities in public areas to help beneficiaries understand their choice of technical options. Investment and recurrent costs were discussed for each option and service level. The community then decided what they wanted and how much they were willing to pay.

Project Results

Communities showed a strong preference for gravity-fed systems over wells and the Yaku handpump over other handpumps. Although beneficiaries expressed a preference for house connections, hardly any chose house connections at first because they would have had to pay the full incremental cost above the cost of a public standpipe. Only 30 percent of the communities went on to expand their water systems, suggesting that many are content with public standpipes and also that they are able to expand their systems on their own.

Beneficiaries also showed a clear preference for family-owned pumps over shared pumps. The project was able to provide these by using low-cost Yaku handpumps. The Yaku is a public domain handpump originally imported

Figure 2.2 Yacupaj implementation strategy

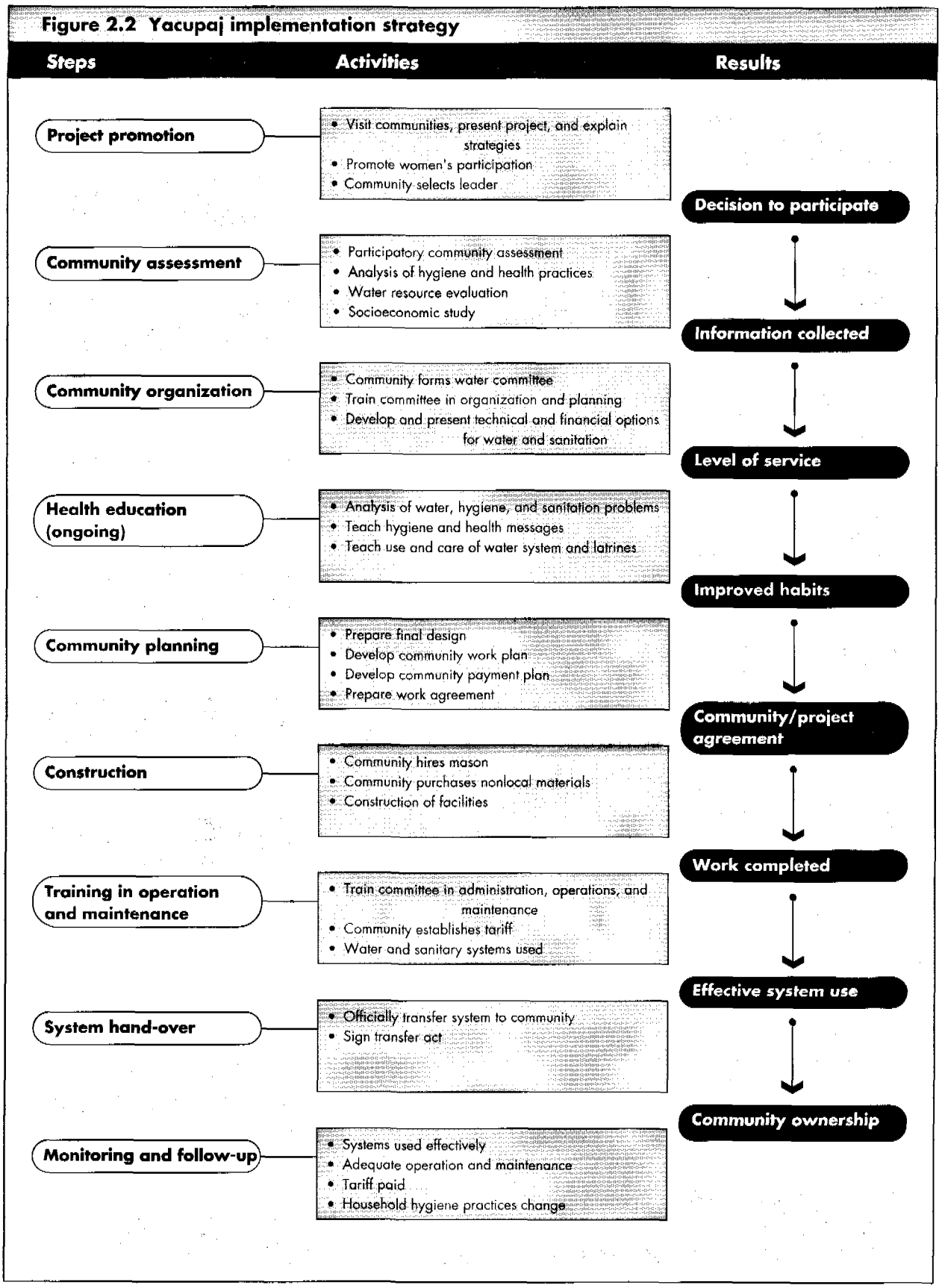


Table 2.4 Basic elements of the training program

Phase	Contents of program
First phase	Project strategy and rules Participatory methodology Project promotion in communities Women's participation Community self-diagnosis Health education I (water-related illnesses)
Second phase	Community organization Planning Technical options, levels of service, and costs Health education II (hygiene and illness prevention)
Third phase	Basic sanitation (cleaning and disinfection, garbage handling, environmental protection, and so on) Health education III (water transport and storage, treatment of illnesses) Operations and maintenance Monitoring and evaluation

Box 2.2 The SARAR methodology

The term SARAR stands for five attributes and capacities—self-esteem, associative strength, resourcefulness, action planning, and responsibility for follow-through—necessary if community participation is to be dynamic and self-sustaining. This technique helps to level the hierarchies within a group, opening the way for all members of a community, including the poorest, most disadvantaged, and least articulate, to participate on a peer basis. UNDP/PROWWESS (Promotion of the Role of Women in Water and Sanitation Services) adapted the SARAR method for use in the rural water supply and sanitation sector in some twenty developing countries on the assumption that a program's success largely depends on enhancing the contribution of community members, particularly rural women.

Trainers present participatory methods and tools at SARAR-based village workshops to create effective learning experiences that help residents conceptualize and carry out specific projects. By getting involved in new ways, participants discover new talents and abilities. This discovery can provide an enormous boost to individual self-confidence and increase trust in the group process. The quality of participation in needs assessment, planning, and creative problem solving steadily improves through the cumulative effect of a series of such experiences.

The SARAR approach emphasizes the extensive use of training materials to achieve its goals. It focuses on five methods:

- Creative: to promote fresh viewpoints, new ideas, and solutions
- Investigative: to demystify research and involve participants in gathering and processing data
- Analytic: to engage participants in problem solving
- Planning: to develop skills in systematic action planning
- Informative: to access information in an enjoyable way.

Monitoring and evaluation form an integral part of all five methods.

Source: "Tools for Community Participation", by Lyra Srinivasan.

Box 2.3 Community profile: El Tambo

Total population	150	**Number of children aged 5–18**	52
Number of families	33	**Number of children younger than 5**	24
Number of women	45	**Number of houses**	36
Number of men	29	**Average distance between houses (meters)**	10–200

Setting. The village of El Tambo is situated in the arid Altiplano, 3,400 meters above sea level and 45 kilometers from the border with Argentina. The climate is cold, with temperatures ranging from 10 degrees Celsius at night to 18 during the day.

Background. All families own their houses, which are constructed out of adobe brick with straw-thatched roofs. Most houses have two or three rooms. There is no electricity or other services. The land is communally held. Principal economic activities include raising livestock (such as cows and sheep) and agricultural production (potatoes and beans). Most men in the community migrate to Argentina during the summer and return to the village in the winter, bringing in cash incomes above the subsistence level. The community has a political leader appointed by the Department, as well as a traditional leader who is democratically elected each year. The community has a mothers' club, a school association, and a health committee. There is a school in the village with two teachers and thirty-three students. The community has a very high literacy rate, with only two illiterate adults. The village has no health post. As perceived by the residents, primary health problems include scabies, parasitosis, respiratory infections, and Chagas disease.

Before the Yacupaj project, approximately one-third of the people used the river and two-thirds used unprotected wells for their water supply. The river is dry for several months of the year. The community felt that the quality of the water they consumed before the project began was good. Each family used an average of 30 liters a day. Children and women collected the water once a day in plastic jugs, which were also used to store the water inside the house. Clothes were washed once a week in the river. Both adults and children washed their hands and faces twice a week, the adults in the river and children in the house.

Project interventions. The Yacupaj project staff first approached El Tambo for a promotional visit and were invited back by the community leader the following week to meet with the entire community. During this meeting project staff introduced the community members to the SARAR participatory methodology and prepared a community map. After four visits by the project staff to analyze community hygiene and health practices, the community formed a water committee and requested the construction of demonstration latrines and Yaku handpumps at the school. Tests of the existing wells in El Tambo showed a high level of fecal coliform contamination. This knowledge helped motivate the community to invest in improved water supply for households. The community requested the construction of eight communal Yaku handpumps and eleven latrines for those who did not already have access. Families paid about US$60 for each handpump and provided all the local materials and labor. A few members of the community chose not to participate.

During an eight-month period project staff held sixteen social development events (training sessions for self-analysis, planning, and health education) and nineteen technical interventions, which included organizing the community for construction, training in handpump installation, operations and maintenance, construction supervision, and water quality control. The community hired a mason who had been trained by the project to undertake the construction. Separate committees for each handpump have created their own rules for administration, operations, and maintenance. The community constructed washing and bathing facilities close to the pumps with its own resources.

Table 2.5 Physical works constructed under Yacupaj

Type of service	Number
Water	
Yaku handpump with hand-dug well	664
Rope and washer pump with hand-dug well	55
Bucket pump with hand-dug well	24
IMIII handpump with deep well	26
Small gravity system (less than 100 beneficiaries)	101
Medium gravity system (100–250 beneficiaries)	71
Large gravity system (more than 250 beneficiaries)	19
Simple spring protection	24
Total	**984**
Number of beneficiaries	**30,253**
Latrines	
Ventilated improved pit (VIP)	1,201
Pour-flush	1,266
Total	**2,467**
Number of beneficiaries	**30,671**

from Bangladesh. The project promoted local manufacturing of the handpump and the development of an international standard. It is now produced in Bolivia and Guatemala.

The project built both private and public latrines, including pour-flush and ventilated improved pit (VIP) latrines. The demand for latrines was greater than anticipated. At first this demand was attributed to the financial policy, in which families paid only 30 percent of the cost. However, even when the policy was changed and families had to pay more than 50 percent of the cost, the demand for latrines remained large. The anti-cholera campaigns by the Ministry of Health during the years of project implementation may be partly responsible for this high demand.

Only a few people were served by each water point (table 2.5). This was due to the high degree of dispersion of communities and people within those communities, typical of the Altiplano region. In contrast, the number of people per latrine was relatively high, because many public facilities were built at schools or health centers.

Human resource development and capacity building

The Yacupaj project focused on human resource development and capacity building to ensure sustainability. It trained a wide range of individuals to participate in project implementation (table 2.6).

Community members were the primary recipients of the project's training efforts. The project helped form 209 water committees, at least one for each system constructed. It also trained 596 operators, who operated and maintained communal systems and family-level handpumps.

Box 2.4 Community profile: Lucas K'ahua

Total population	154	**Number of children aged 5–18**	53
Number of families	40	**Number of children younger than 5**	25
Number of women	34	**Number of houses**	40
Number of men	42	**Average distance between houses (meters)**	10–500

Setting. Lucas K'ahua is located in a mountainous region of the province of Chayanta at an elevation of 3,300 meters above sea level. The population within the community is very dispersed, distributed over four ranchos (hamlets). About 30 hectares of land are cultivated, and the community has access to an additional 50 hectares of pasture. It receives about 300 millimeters of precipitation a year.

Background. All families own their houses, which are constructed out of adobe brick with straw-thatched roofs. Most houses have one or two rooms. There is no electricity or other services. Most community residents are bilingual in Spanish and Quechua, with the older residents speaking only Quechua. Principal economic activities include agriculture (corn, potatoes, barley, wheat, sweet potatoes, and beans) and livestock (sheep, llamas, and pigs).

Lucas K'ahua has one school with a single teacher for thirty-three students in three grades. The community has a very high illiteracy rate—69 percent. There is no health post in the community, and the closest one is 7 kilometers away. The residents report that the major health problems are diarrhea, scabies, and parasitosis. At the time of the survey there had been twenty cases of diarrhea in the community during the previous month.

Before the Yacupaj project, the residents used a stream as a water source. Each family used an average of 20 liters a day. Women collected the water in tin cans and ceramic jugs and stored it in these containers inside the kitchen. None of the families had latrines, but there was one latrine in the school. Garbage was disposed of in the open close to the houses and the organic waste was used to feed domestic animals. The community had worked with IPTK, a local NGO, to improve agricultural production during the past several years.

Project interventions. The community became interested in Yacupaj after the schoolteacher attended a training event on the project and its policies. The community's first request was to construct two latrines at the school. The community provided all of the labor and locally available materials (about 40 percent of the cost). The latrine construction was delayed because of heavy workloads in the fields and end of the year festivities, and as a result many people lost interest during the first four months. But once the latrines were finished, the teacher organized a school health day and brought the community together with the idea of constructing spring protection and a water distribution system.

Project staff assisted the community in collecting topographical data and designing the water system. The community contribution to the cost of the project was significant: unskilled labor, locally available materials, and 30 percent of the value of the materials purchased. The total cash contribution was about US$1,000. Each family contributed the equivalent of Bs 254 (US$53) in cash and in kind. The works consisted of a spring protection, a 4.8 cubic meter storage tank, 1,300 meters of pipe main, and a 1,200 meter distribution network to serve four public standpipes. The community elected a six-member water committee that received three days of training and established a monthly tariff of Bs 1 (US$0.20) per household.

Box 2.5 Community profile: Huancarani

Total population	55	**Number of children aged 5–18**	19
Number of families	11	**Number of children younger than 5**	9
Number of women	17	**Number of houses**	11*
Number of men	10	**Average distance between houses (meters)**	100

*Seven houses together and four dispersed.

Setting. Huacarani is located 3,800 meters above sea level in the most arid area of the Bolivian Altiplano. All of the men migrate seasonally to the valley.

Background. All families own their houses, which are constructed out of adobe brick and rock with straw-thatched roofs. Most houses have one or two rooms. There is no electricity or other services. Every family in the village raises llamas and alpaca. The other principal economic activity is agriculture (potatoes and quinua). The 86 hectares of land are communally held and are used for animal grazing. The community has a traditional leader, a government-appointed deputy, and a school association. Huacarani has a school with one teacher and twenty students. Thirty-two percent of the adult population is illiterate. There is no health post in the community, but there is a midwife. As perceived by the population, the major health problems include respiratory infections, diarrhea, scabies, and parasitosis. There is a strong evangelical presence in the community, and the priest from a nearby town is always consulted before decisions are made.

Before the Yacupaj project people used a single unimproved, hand-dug well 70 meters from the village and a spring 100 meters from the village. The community felt that the quality of the water they consumed before the project began was average. Women and children collected about 20 liters of water per family each day in a tin bucket. Clothes were washed once a week in the river, and adults bathed once a week in the house. Children's faces and hands were washed daily. The community had no latrines.

Project interventions. Yacupaj was the first outside agency that had ever approached the community besides the school and the church. The project trained two promoters selected by the community to undertake participatory analyses of water sources, water uses, and health needs. Community members expressed an initial interest in latrines and constructed three latrines in the school and six household latrines. Two additional latrines were built by the community without assistance from the project.

The water situation was more difficult because more than half the community lives in the valley for a considerable part of the year and also because some community members did not want to tap the spring for religious reasons. Although the well had a good recharge rate, its water was quite saline and no one in the community used it for drinking. It therefore made little sense to place a handpump on the well. In the end some families decided to dig a new well close to the school and purchased a Yaku handpump. The families that did not participate were not allowed to use the pump. A year after the construction, the community believed that there was more water available for their animals and therefore felt the investment was justified.

Table 2.6 Human resource development

People trained	Number trained
Project and NGO staff	56
Health workers (Ministry of Health)	199
Teachers (Ministry of Education)	189
Community leaders and promoters	247
Masons (private sector)	288
Store owners	8
Total	987

Table 2.7 Cost breakdown for materials, labor, and transportation (percent)

Item	Yacupaj	Community	Total
Nonlocal materials	52	21	73
Local materials	0	8	8
Subtotal materials	52	29	81
Unskilled labor	0	8	8
Skilled labor	10	0	10
Subtotal labor	10	8	18
Transport	0	1	1
Total	62	38	100

More than 4,200 community development activities took place with more than 125,000 participants, of whom 35 percent were women, 43 percent men, and 22 percent children.

The project developed thirty-nine participatory techniques for the four stages of social intervention: organization, planning, training in operations and maintenance, and hygiene education. Fieldworkers were given training and support materials for all techniques and could decide which ones to use. The fifteen most frequently adopted techniques were incorporated into a mass-produced "toolkit," which the project distributed to institutions throughout Bolivia.

Detailed analysis of project costs

The total project cost was US$2.8 million, of which US$2.44 million was provided by the Dutch government, US$120,000 by the Bolivian government, and US$240,000 by the beneficiaries.

The beneficiaries contributed 30 percent of the cash cost of nonlocal materials, all locally available materials, and all labor for construction and transportation (table 2.7). The direct cost of the works was US$600,000, of which 60 percent was provided by the project and 40 percent by the community. These costs do not include taxes, technical assistance, or administrative or logistical support.The average per capita cost for water systems was US$12–18. Demonstration units cost less per capita because they were constructed as public facilities.The total direct cost to beneficiaries of different technical options is shown in table 2.8.

Table 2.8 Cost of technical options for water supply (US$)

Technical option	Cost to community	Average number of users	Per capita costs
Well with Yaku handpump	252	17	15
Well with rope pump	165	9	18
Well with bucket pump	153	9	17
Well with IMIII pump	708	60	12
Small gravity system	272	30	9
Medium-size gravity system	1,060	100	11
Large gravity system	2,946	240	12
Spring protection	138	33	4*

* Not a representative sample.

Table 2.9 Recurrent costs and the life of different water supply options

Technical option	Annual cost (US$)	Life (years)
Well with Yaku handpump	6	15
Well with rope pump	5	8
Well with bucket pump	5	8
Well with IMIII pump	5	20
Small gravity system	9	15
Medium gravity system	13	15
Large gravity system	21	15
Spring protection	4	15

The sanitation options cost US$77 for each ventilated improved pit latrine and US$94 for each pour-flush latrine. The project paid 62 percent of these costs and the community 38 percent. Sixty-five percent of the cost was for materials, 33 percent for labor, and 2 percent for transport. Although infrastructure costs were very low (table 2.9), the cost of social investment in community development was nearly 90 percent of the total investment cost. Technical support (project design and construction supervision) was an additional 60 percent. For every US$1 invested in infrastructure, the project spent an additional US$1.50 on social work and technical support. Administrative and technical assistance costs were also high and included the cost of the regional offices in La Paz and Potosi and the three provincial offices, as well as evaluation, dissemination, training material production, technology development, and so on. However, these costs were justified by the experimental nature of the project and its long-term institutional and policy development objectives. Per capita costs were still lower than for most other projects in the country. By region, 3 percent of the project costs were spent in La Paz, 48 percent in Potosi, and 49 percent in the provinces.

Table 2.11 Latrine use and condition one year after project conclusion

Type of latrine	In use	Not in use	Well mantained	Not well maintained
Ventilated improved pit	70	29	30	69
Pour-flush	71	3	62	12
Total	141	32	92	81

* Not a representative sample.

Table 2.12 Summary of water source and use (percent)

Use	Water system	River	Unimproved spring	Unimproved well	Does not apply	Other
Drinking and cooking	99	0	0.6	0	0	0.2
Hygiene and bathing	92	6	1	0	0	0.4
Construction	46	22	4	6	20	2
Irrigation (gardens)	13	9	3	1	67	7
Irrigation (greenhouses)	4	0.2	0	0.4	94	1
Irrigation (fields)	0.2	29	6	1	23	40
Livestock	8	60	8	3	15	7

Where communal facilities were built, the project promoted standardized water committees comprising a president, a treasurer, a secretary, and members. However, many communities preferred to use existing leadership structures. The project also initially tried to promote community tariffs. However, rural communities in Bolivia traditionally collect money only for special occasions such as construction, marriages, or funerals. Because there is no banking system, communities shied away from tariffs. The few communities that did establish a tariff system collected US$0.20–$1.00 a month for each member of a household.

Project evaluation

Two external studies evaluated the quantitative and qualitative results of Yacupaj at the community level. The first was completed during the final months of project implementation (Castrillo, August 1994) and the second a year after project completion (Soto, July 1995). The Castrillo study conducted knowledge, attitudes, and practice surveys of families and water committees in ninety communities. More detailed rapid assessment procedures were carried out in forty-two of these communities: open-ended questions, semi-structured groups and group interviews, and direct observation. The Soto study assessed sustainability in 120 communities (29 percent of project communities) and consisted of surveys, interviews, and field observations. Both studies showed that more than 90 percent of the water systems and 82 percent of the latrines continue to function, and that communities have financed and carried out repairs. However, the studies also indicate that few communities practice preventive maintenance, such as water disinfection and replacement of wearing parts.

Sustained use of water systems

The 1995 study showed that 93 percent of water systems and 91 percent of handpumps were

Table 2.10 Sustainability of water system and handpumps

	Years in operation	Condition of the work			Level of service provided			Water supply		
Type of infrastructure		Good	Fair	Major defects	Optimal	Functional	Not in service	Good	Fair	Poor
Water systems	1–3	41 (73%)	11 (20%)	4 (7%)	37 (66%)	18 (32%)	1 (2%)	12 (21%)	34 (61%)	10 (18%)
Handpumps (56)	1–4	134 (75%)	28 (16%)	17 (9%)	103 (82%)	16 (13%)	7 (5%)	29 (42%)	29 (42%)	11 (16%)

Note: One water system and seven handpumps were out of service. The major defects were mainly due to faults during the construction.

functioning (table 2.12). Since the project had ended, thirty-seven percent of the systems had broken down twice and 91 percent of these systems had been repaired. The most common problems were leakage in the water mains and faulty taps.Communities carried out 80 percent of repairs themselves and sought external assistance for the other 20 percent from a mason, a schoolteacher, a field worker, or a neighboring community. In addition, 72 percent of the communities spent money to repair the system. An average of Bs 17 (US$4) was spent. Only 6 percent of community operators were paid for their work. Downtime between breakdown and repair averaged three days, although 72 percent of repairs were made immediately by the community. The need to travel long distances to purchase spare parts contributed to delays: 44 percent of beneficiaries purchased the parts in a provincial store and 11 percent in the city. Thirty-four percent of the beneficiaries did not know where the parts were available.

Asked where they would seek help if the system broke down, 78 percent of beneficiaries said the community, 6 percent said the mason, 8 percent said elsewhere, and 8 percent did not know. This shows that on the whole communities have accepted their responsibility for system management.

Latrine use. The 1995 study showed that 57 percent of latrines were in good condition, 24 percent were in average condition, and 17 percent were very poorly maintained or out of service (table 2.10). The main problems were caused by poor construction and improper operations and maintenance. Problems included deterioration of the plaster siding (59 percent), the odor of ventilated improved pit latrines (29 percent), and clogging of the siphon (12 percent) for pour-flush latrines. Pour-flush latrines are better used and maintained than dry pit latrines because people have to use water to flush them.

Effective use of water systems. Domestic water consumption in the Altiplano is extremely low because of the cold climate and traditional hygiene practices (table 2.11). The project has had little impact in increasing water consumption from 10 liters per capita per day, suggesting a weakness in the hygiene education component of the project. It also shows that behavior change is difficult to achieve and occurs only over a long period of time.

The project encouraged women to participate in all phases. Women made up 35 percent of participants in all community development activities but only 7 percent of the members of water committees. This low level of participation was apparently due to cultural biases that limited women to "behind the scenes" participation. In an effort to overcome such biases and directly involve women in planning, the project required

Table 2.13 Water storage hygiene comparison of beneficiaries with nobeneficiaries

Sample	Total	Clean container	Dirty container
Beneficiaries	463	55	45
Nonbeneficiaries	242	34	66

Table 2.14 Water quality breakdown and definitions

Type of water tested	Number	Percentage of total	E. Coli count per 100 ml	Total coliform count per 100 ml	pH	Turbidity net unit	Taste
Water Systems							
Good	12	21	0	0	6.8–7.4	<5	None
Acceptable	34	61	1–9	1–12	6.2–7.7	<5	None
Unacceptable	10	18	10–50	13–63	7.8–8.2	>5	None
Handpumps							
Good	29	42	0	0	6.8–7.4	<5	None
Acceptable	29	42	1–9	1–15	6.2–7.7	<5	None
Unacceptable	11	16	10–99	16–99	7.8–8.2	>5	None

Note: According to World Health Organization standards.

that women cosign all project-related contracts with their husbands. Women signing the contracts on their own would have been unacceptable to communities, although women draw 89 percent of the water used by households. The project also focused on improving hygiene practices of carrying and storing water. Although beneficiaries' hygiene practices improved, 45 percent still use a dirty container (table 2.13). The 1995 study shows, however, that project beneficiaries store much less water, because they do not need to walk as far to fetch it. This improvement should help avoid contamination of drawn water and lead to health benefits.

The water quality breakdown makes a strong case for the application of chlorine to water sources to prevent contamination (table 2.14). Although all communities were trained to apply locally available chlorine, few did so because they were not convinced of the need. The 1995 study found bacterial contamination in a small number of water points with the same level of contamination in both handpumps and water systems.

Results of strategy. The project clearly satisfied demand: the substantial community contributions to the cost reflected a need for the services. In addition, only communities that wanted to improve their water system sought out the project.The Yacupaj project served approximately one-third of the 115,000 people eligible to participate. The studies found that 85 percent of the communities that did not participate knew about the Yacupaj project but did not consider water and sanitation a priority. These communities reported that their water source was too far away for the project to provide support, or that they were satisfied with the services they already had. Only 7 percent of the respondents said that they did not build a latrine because they could not afford it.

The Yacupaj project motivated the private sector to provide goods and services on a commercial basis after it was completed. The 1995 study showed that 47 percent of the communities had expanded their water systems by adding new connections (an increase of 17 percent over the previous year). Five stores in three provinces stock spare parts, and four stores have purchased new spare parts directly from the Yaku handpump manufacturer in the Department of Cochabamba.

Lessons from the Pilot Project

The lessons from the Yacupaj pilot project, summarized below, provide a sound basis for national policy development.

- ***Poor beneficiaries are willing to select and pay for water and sanitation services.*** The Yacupaj project demonstrated that even the poorest communities are willing to make a substantial contribution to investment costs. Communities do not always choose the cheapest option, nor do they necessarily select water and sanitation together. However, it is difficult to convince project staff and the government that poor communities can select and pay for desired service levels. This must be overcome through upfront staff training. Project staff must fully adhere to the concept that a project must be demand driven.
- ***Incentives and control measures should be used to reduce investment cost.*** Because most rural water and sanitation investments in Bolivia are highly subsidized, beneficiaries do not contribute the majority of costs, and a financial policy solely based on cost sharing does not provide an incentive to reduce costs. The Yacupaj project obtained high levels of community contribution and demonstrated that costs can be reduced with the use of low-cost technologies, standardized technical designs, simplified project preparation procedures, and strict controls. Since these measures involve additional administration and supervision costs, they may be too expensive to replicate in a national program.
- ***The social component should be simple and not obscure the project's objectives.*** It was often difficult to maintain a balance between applying participatory methodologies and implementing the project efficiently. The project must clearly establish the goals of its social component: community participation, women's participation, training for operations and maintenance, and hygiene education should be a means to specific project objectives, not ends in themselves.
- ***Projects must be grouped in order to increase efficiency.*** The dispersed rural communities of Bolivia require projects to be grouped to increase efficiency and achieve economies of scale. Grouping projects reduces the number of intermediaries and simplifies preparation, appraisal, procurement, and implementation. It also generates momentum, as new communities see projects work in neighboring communities and ask to participate.
- ***Institutional support is essential.*** Most rural water supply and sanitation projects aim to deliver services managed by the community without further government intervention. However, the Yacupaj experience shows that communities need long-term technical and institutional support. Communities rarely undertake preventive maintenance or monitor water quality. Although the private sector can provide skills and spare parts, communities continue to need training and technical assistance to solve some problems, especially when water committee members leave the community. Yacupaj demonstrated the need for local governments to play a role in rural water and sanitation projects.
- ***Institutional linkages at the national level are needed to ensure replication of the pilot project.*** The pilot project should share its experience of both successes and failures. Although often costly and time-consuming, regular workshops and seminars on major sector issues are essential for the development of a national policy.

The scope of the pilot project should be limited. Staff must resist the temptation to test too

many elements—if a pilot project becomes too complex, it will not be replicable. The Yacupaj staff reinvented many aspects of the project where they should have used proven methodologies. In particular, they wasted time and resources designing a large number of community development exercises. Technology development should also be left to better qualified institutions. The project must focus on a few well-defined and measurable activities.

Part 3: The Evolution of a National Program

In 1991 Bolivia initiated a major institutional restructuring of the water and sanitation sector to improve service delivery to the poor in rural and urban areas. The government declared improvement in water and sanitation coverage a national priority and reorganized the sector's institutional structure. Most activities related to construction, human resources development, and service administration previously under the Corporaciones de Aguas and the Directorate of Environmental Sanitation of the Ministry of Health were transferred to the private sector, local communities, and NGOs.

As part of these reforms the government made the National Directorate for Water and Sanitation (DINASBA) responsible for prioritizing water, sewerage, and solid waste projects at the national level, preparing national investments, coordinating regional and local programs, implementing government financial policies, and promoting institutional development. The government also created water and sanitation units (UNASBAs) responsible for planning and technical assistance at the departmental level. The UNASBAs are part of the departmental governments that replaced the Regional Development Corporations. They will assist municipalities and local communities in designing and implementing investment projects, and provide support to local organizations in the operations and maintenance of water and sanitation facilities.

In 1992 the government published the 1992–2000 National Water and Sanitation Plan as part of the "Water for All" initiative promoted by the President of the Republic. This plan aimed to improve sector coverage, giving priority to rural areas for the first time. It called for public investment of US$769 million over the eight-year period (about US$100 million a year), of which 70 percent was to be funded by external sources. Institutional and resource constraints, however, have made achieving these objectives difficult.

In 1994 the government launched a second-generation reform program by passing the Popular Participation Law, which decentralized financial resources and political power. The law has created about 300 new municipalities in rural areas and assigned legal status to the Organizaciones Territoriales de Base (OTB), community-based groups organized according

to their social background and culture. Before the reform there were only 100 municipalities in Bolivia, and they had no jurisdiction over rural communities. The new law allocated substantial fiscal resources to the municipalities and gave them responsibility for the provision of water and sanitation services.

In April 1993 the government asked the World Bank to fund a large rural water and sanitation project, Proyecto de Saneamiento Basico Rural (PROSABAR), to increase coverage on a sustainable basis. The project has two main components: an infrastructure program of US$35.7 million and an institutional strengthening component of US$8.3 million. Project preparation was funded through three Project Preparation Facility loans totaling US$1.7 million. UNDP contributed an additional US$150,000.

The government decentralization reforms require PROSABAR to work with Bolivia's Social Investment Fund. Established in 1990, the fund grew out of the highly successful Emergency Social Fund, a temporary agency designed to create employment opportunities. In contrast, the Social Investment Fund has become a permanent institution. It serves as a financial intermediary that mobilizes donor and government resources and channels funds to projects carried out by a range of public or private agencies. Its high degree of institutional autonomy within the Ministry of the Presidency is intended to prevent political interference in the process of appraisal and approval.

The Social Investment Fund does not implement projects, but appraises, finances, and monitors proposals submitted by municipalities. By working through existing organizations, it is able to concentrate on the quick disbursement of funds. The agencies proposing the projects absorb the bulk of the costs of identifying projects, organizing communities, and preparing and submitting proposals.

The Social Investment Fund's long-term involvement in the water and sanitation sector has been accompanied by significant drawbacks. Its considerable autonomy has led to poor coordination with sector authorities. Its institutional incentives favor the disbursement of funds over the quality or sustainability of investments, and it has often responded to demands of contractors instead of communities. Its administrative costs are high, at 14 percent of investment cost, and it has a very centralized decisionmaking structure. Generally large projects are funded.

Before the government initiated the PROSABAR project, DINASBA was institutionally weak and did not assume its full role in the sector. Government investments were mainly channeled through the Social Investment Fund or the regional development corporations. The absence of a sector policy had severe implications for increasing coverage and the sustainability of investments. Most water and sanitation investments were made by international NGOs, bilaterally funded projects, and other external support agencies, with little sector coordination. The government had little influence over where or what type of investments were made. In addition, there was no formal transfer of assets to the communities and no institutional backstopping mechanism to ensure the sustainability of investments. For these reasons the government used PROSABAR to establish rules for sector policy and to develop institutional capacity at the regional level to work more closely with municipal governments and communities.

Beyond the Pilot Project

The Yacupaj experience set the stage for PROSABAR. First, PROSABAR adopted the Yacupaj strategy of working through existing institutions. Yacupaj relied on intermediaries for project promotion, hygiene education, selection of technical options, construction, supervision, and monitoring and evaluation, and worked with regional and national governments to strengthen local capacity. This strategy became an important element of PROSABAR as well. The project preparation team worked with six-

teen NGOs at the municipal and departmental levels to complete preparation activities. The activities followed a participatory process involving regional authorities and local water and sanitation units.

Second, PROSABAR built on the Yacupaj approach of community participation to ensure project sustainability. Yacupaj had demonstrated that beneficiaries should be actively involved in the decisions affecting their welfare and contribute substantially to the project. The project should provide adequate information on technical options and costs, service levels, and hygiene, but beneficiaries should make the final decisions. Although PROSABAR did not achieve the same level of community participation as Yacupaj, the approach remained the same.

Third, many sector professionals trained by the Yacupaj project have been hired by PROSABAR, including two of Yacupaj's four engineers. All the social advisors for PROSABAR also worked on Yacupaj, and fieldworkers from Yacupaj continue to work with NGOs in the communities. This transfer of staff has contributed to sector consensus and has helped to create a sense of ownership of policies among staff.

Fourth, Yacupaj demonstrated the importance of an adaptive project design and the merits of revising implementation strategies. In particular, Yacupaj changed its financial policy for latrines several times and streamlined its social process. The PROSABAR preparation team depended on the adaptive approach from the start, and sought to build on the experience of others. Yacupaj also gradually transferred responsibility for implementation to the intermediaries. During the first year the intermediaries were responsible for the social component. In the second year they became involved in the social and technical project components, though they still lacked financial autonomy. In the third year they were given full authority for all aspects of the project. Each intermediary tailored the Yacupaj strategy to their particular institutional goals. This strategy was so successful that IPTK now requires a similar cost sharing arrangement for all their projects.

Institutional Arrangements

The preparation team for PROSABAR, focused on establishing institutional arrangements that would promote greater efficiency and sustainability. Scaling up the Yacupaj project to the national level required a new set of rules.

Guiding principles of project design

In developing the rules of PROSABAR, the preparation team relied on a set of guiding principles of project design. The principles were developed by the Nordic donor community and endorsed at the 1992 International Conference on Water and the Environment in Dublin. The following summaries are drawn from "An Institutional Framework for Community Water Supply and Sanitation Services," by M. Garn.

Water as an economic good. Managing water as an economic good requires attention to the principles that should guide allocation among users. These principles must be considered in decisions about the use of public and private funds and investment in rural areas.

Managing water as an economic good also requires that projects provide incentives for the efficient and effective use of facilities. The price charged for services must reflect the economic value of water to users and the cost of providing services. In practice, the government usually sets prices that do not necessarily correspond to the value that users attach to the service. Policymakers must establish rules to create more consistent relationships between the value, price, and cost of services. The overall aim is to create investments in which the value attached to a service is greater than cost, and therefore, a service for which people are willing to pay.

The PROSABAR financial policy seeks to ensure that there is enough economic demand for projects in communities to make them sus-

tainable. The requirement for communities to contribute to projects and select their own levels of service is intended to do this.

Management at the lowest appropriate level. Management decisions should be made at the lowest appropriate level. In other words, at a level that encompasses but does not go beyond the range of demands being addressed. Because demand for community water supply and sanitation services is local, responsibility for managerial decisions about levels of service, location of facilities, and cost sharing should be kept local as well. High-level government agencies should establish institutional rules, regulations, and processes that encourage such local decisions.

This concept is closely linked to that of stakeholder participation. Projects should work through existing institutions, by developing partnerships with national and regional governments and using NGOs and other intermediaries to plan, implement, and monitor activities in the communities. Projects should also encourage the private sector to play a role. The project will benefit from the experience of local people and build national capacity at the same time. This strategy helps to institutionalize policy and procedures and leads to long-term sustainability.

In PROSABAR primary responsibility for management rests with communities and municipal governments. The communities must initiate the projects and work closely with the municipal governments responsible for rural water and sanitation investments.

Project management

Because PROSABAR is designed to strengthen sector institutions, DINASBA is responsible for overall project management (figure 3.1). A small project unit within DINASBA, consisting of a coordinator, a social advisor, a technical advisor, and a monitoring and evaluation specialist will oversee day-to-day implementation of PROSABAR.

The Social Investment Fund manages the infrastructure component of the project, and the UNASBAs manages the institutional component. The decentralization of the institutional component to the UNASBAs will ensure that all investments are accompanied by a rigorous community development and training program. It will also develop capacity for institutional support and backstopping at the municipal and departmental levels. PROSABAR will also be responsible for capacity building and monitoring and evaluating overall project progress and results.

The arrangements for project management allow communities and municipalities to make key decisions, ensuring that investments respond to local demand. The project also focuses on long-term investment sustainability by addressing the technical assistance and institutional support needs of the community and municipality. Efficiency is achieved through competitive bidding processes and private sector participation.

Project implementation

Implementation procedures have been designed to ensure that the project responds to demand to the greatest possible extent. Communities, municipal governments, and departmental governments are involved at all phases, and decisions are made at the lowest appropriate level.

Mass media campaigns are used to promote the project and its rules. Communities that are fully informed of project policies request to participate through their municipal government. Municipalities will cosponsor community requests and include the projects in annual municipal operating plans. Under the Popular Participation Law, these plans require departmental and national government approval. The plans will be forwarded to the UNASBAs, which will contract intermediaries to perform the preinvestment work. Communities will receive support in organization, water committee formation, and service-level selection. Community-municipality relations will also be strengthened and agreements will be reached on financing modalities. The intermediaries will produce engineering designs, proposals for social interventions, and training and cost estimates. The UNASBAs will

Figure 3.1 Flowchart of institutional arrangements

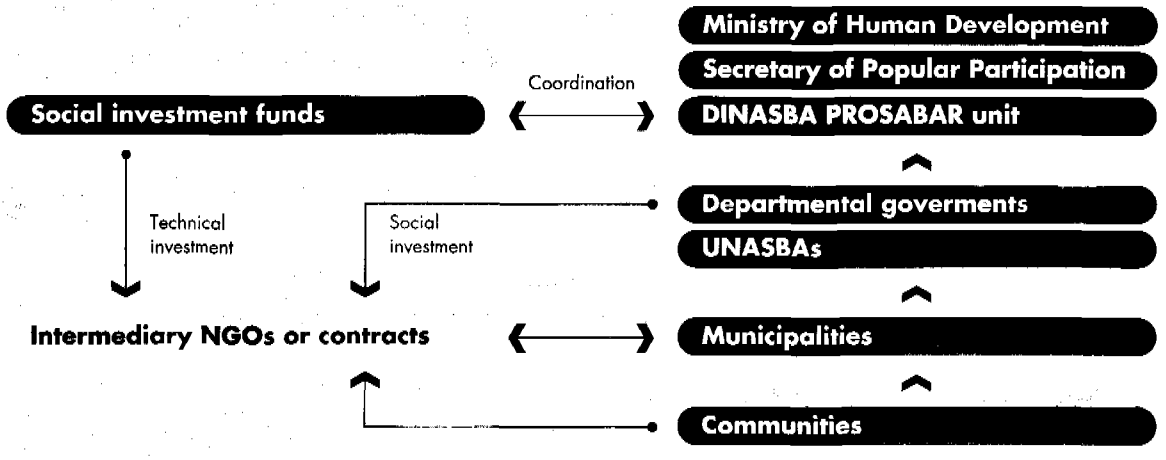


Figure 3.2 Contracting arrangements for procurement

Phase I Preconstruction	Phase II Construction	Phase III Postconstruction
Social component	**Social component** Contract with UNASBA	**Social component**
Technical design Contract with UNASBA	**Infrastucture component** Contract with Social Investment Fund Investment Fund	
	Construction supervision Contract with Social Investment Fund	

verify that a participatory process was followed and that the service options reflect community demand.

At the community level, PROSABAR will separate the social and infrastructure components of the project during the bidding process and contract separately with NGOs and construction firms before, during, and after construction (figure 3.2).

The Social Investment Fund will appraise, contract, and supervise the investments in infrastructure. Once subprojects are approved, the municipal government will then be responsible for paying the community and municipal contributions into the Social Investment Fund account as a prerequisite to the bidding process. The UNASBA will contract an intermediary responsible for continued community support, training in administration, operations and maintenance, and environmental and hygiene education.

In the Yacupaj project intermediaries were selected based on their experience in a region,

and contracts were often negotiated on a noncompetitive basis. PROSABAR aims to increase competition by creating bidding packages for a larger number of communities and hence achieve savings through economies of scale. One large intermediary could receive the contract for the social component of an entire department and subcontract implementation to smaller agencies. In addition, because PROSABAR involves some investments that are considerably larger than those in Yacupaj, the project demands the resources and technical expertise of specialized construction firms.

The original design of PROSABAR included two bidding processes: the construction component was contracted by the Social Investment Fund, and all other activities were contracted by the UNASBAs. This policy was later changed because the Social Investment Fund wanted to separate construction from construction supervision. The social component was also split into two parts (preinvestment and implementation) to accommodate the Social Investment Fund's formal processes for appraisal and bidding.

Separating the technical and social components of PROSABAR introduces the risk of working with at least two intermediaries, making it more complex than the pilot project. It may encourage more technically complex projects that will entice large construction firms. It also limits opportunities for the communities to construct projects themselves and may lead to a lack of coordination between the social and technical processes.

Establishing the Rules

During project preparation PROSABAR focused on developing a coherent set of rules defining the financial policy, eligibility criteria, and levels of service that would make the project responsive to demand.

Financial policy

PROSABAR's objective is to provide sustainable water and sanitation services to the maximum number of people. This objective has several implications for the project's financial policy:

- A strong community contribution in cash and in kind is essential to give a sense of ownership, because communities are more likely to maintain and repair systems that they have selected and built.
- The municipalities' contribution is also essential to project sustainability because it gives them partial responsibility and supports the government's Popular Participation Law.
- Contributions from municipalities and communities allow the government to spread resources over a larger number of people.
- To reach the maximum number of people, the project must establish a per capita subsidy ceiling for government investment.

During preparation the PROSABAR team asked NGOs and other sector agencies about their experiences with cost recovery and community willingness to pay. The survey revealed a wide range of financial policies. The Social Investment Fund required the lowest community contribution of those asked—20 percent of investment cost—and rarely enforced the policy. Most projects required percentage contributions to the investment cost and a contribution in kind of about 20–25 percent.

The municipalities were also involved in developing the financial policy. The Popular Participation Law, by giving municipalities substantial new resources and the responsibility for water and sanitation sector investments, had underscored the need to foster the relationship between communities and municipalities.

Because a subsidy ceiling provides the best incentive for communities to make choices and lower costs, the PROSABAR preparation team focused on defining the government subsidy as a fixed amount of money, regardless of the level of service chosen. Communities would be required to contribute a share of the investment cost up to the ceiling, and to pay full costs above it.

PROSABAR staff looked at precedents to help determine the subsidy ceiling. The Yacupaj project had a total per capita investment cost of US$46, of which a high percentage went to community development. The per capita costs of infrastructure were US$12–20. At the other extreme, most NGOs and government agencies, including the Social Investment Fund, have historically accepted per capita investment costs as high as US$100–$120.

First set of rules: Testing the rules. At first per capita ceilings were set at US$40 for projects benefiting fewer than 250 people and US$80 for larger projects. These ceilings corresponded to government subsidies of US$26 and US$52. These ceilings were set based on analysis and discussions with major sector actors such as CARE, UNICEF, the Social Investment Fund, and departmental UNASBAs. The ceilings were intended to serve as the basis for preliminary financial policy and to be revised at a later date (table 3.1).

Initially it was assumed that smaller communities would receive lower levels of service (handpumps and standpipes) than larger communities. However, this went against the basic principle that communities should be able to choose their levels of service. The original financial policy also assumed that the bulk of community contributions would be in kind.

In August 1994 sixteen NGOs were contracted to prepare proposals for the investment and social components of PROSABAR. About 300 proposals were submitted. However, these proposals were found to be overdesigned and too costly, for the following reasons:

- The NGOs ignored the cost ceilings because they did not believe they would be strictly enforced.
- Because the NGOs had been contracted on the implicit understanding that they would implement their proposals and receive a percentage of the cost, they had a strong incentive not only to overdesign the project but also to increase unit costs.
- The NGOs did not properly communicate the financial policy to the communities, who thus could not choose technical options based on costs.
- Communities did not value their contributions in kind and therefore selected more costly options without understanding the full cost implications.

Second set of rules: The recommended rules. Faced with this situation, the preparation team conducted a study in January 1995 to make recommendations for a new financial policy and establish a single subsidy ceiling. A team of engineers and a financial analyst conducted a field study to determine the extent to which the proposed projects had been overdesigned by the NGOs. This study examined forty proposals, revised the cost estimates, and calculated a coefficient of overvaluation for each NGO equal to the initial estimate divided by the revised estimate (table 3.2). It soon became clear that in the absence of national technical standards, agencies had adopted their own technical parameters for project design and cost. These included population growth rate projections, per capita water consumption rates, and factors of peak hours and daily flows. The preparation team then applied the coefficient for each NGO to all projects to determine the revised cost estimate. The team found that 70 percent of the projects had a per capita cost of less than US$71.

The preparation team decided that PROSABAR should aim for coverage of 70 percent. This goal was ambitious given the current 24 percent coverage level in rural areas. The investment ceiling was set at US$71 per capita, leading to a maximum subsidy by the central government of US$50 (US$71 per capita x 70 percent subsidy level).

Because the Social Investment Fund was opposed to having contractors assume the risk of community contributions in kind, the project preparation team decided that the municipality

Table 3.1 Financial policy under the first set of rules (subsidy ceiling US$40 for communities with less than 250 people; US$80 for communities with greater than 250 people)

Participant contribution to project cost	
PROSABAR	65% up to ceiling
Municipalities	10%
Community	25% plus 100% above ceiling

Table 3.2 Average coefficient of overvaluation for proposals by department

Department	Coefficient of overvaluation
Chuquisaca	20
Cochabamba	24
La Paz	27
Potosi	4

should guarantee the community's contribution in cash and then negotiate cost recovery with the community. This arrangement was also intended to strengthen the link between municipalities and communities.

Three possible options would allow the municipality to recover the community's contribution. The first is a simple credit scheme in which the community pays 5 percent up front and repays the rest over time. In the second option the contractor hires community members as unskilled laborers, and the community members use their earnings to repay the municipality. The third option lets communities construct facilities themselves in cases where the contractor or NGO agrees to assume the risk of community labor. In all cases the community must make a contribution before benefiting from the project.

The NGOs were given the new financial rules and technical design parameters and asked to reformulate the projects. They also returned to the communities to negotiate the new policy and to make it clear that contributions would be strictly enforced. A detailed financial analysis of PROSABAR's preinvestment outcome was then conducted based on data from approximately 200 reformulated projects. This analysis defined the financial policy ultimately recommended to the government and supported by the Bank (table 3.3).

The financial policy was effective in reducing costs (table 3.4). In Chuquisaca and La Paz per capita costs of the revised projects fell from about US$100 to the per capita ceiling of US$71, which allowed these departments to benefit from the maximum available subsidy. In contrast, the Department of Potosi increased its per capita costs from US$41 to US$49 to benefit from the larger subsidy.

Third set of rules: Consensus. The newly appointed task manager of PROSABAR recognized that the lack of sector policy was a major issue and encouraged the government to establish a national sector policy based on the second set of rules. The Social Investment Fund accepted PROSABAR rules until June 1995, when it officially changed hands and no longer reported to the Secretary of Social Investment, but to the Minister of the Presidency. As a result PROSABAR suddenly had to work with two separate ministries. At this point the Social Investment Fund asked for another review of the financial policy and decided to have the subsidy increased to

Table 3.3 Financial policy under the second set of rules (subsidy ceiling US$50 per capita)

Participant	Contribution up to ceiling	Contribution above ceiling
PROSABAR	70%	0%
Municipalities	10% plus 15% recovered from the community	0%
Community	5% up front plus 15% reimbursed to the municipality	100%

Table 3.4 Reduction in per capita project costs under the second set of rules

Department	First set of rules	Second set of rules	Percentage change
La Paz	107	70	-34
Chuquisaca	99	72	-28
Cochabamba	63	54	-14
Potosi	41	49	42
Mean	68	62	-8

Table 3.5 Financial policy under the third set of rules (subsidy ceiling US$70 per capita for water projects, US$65 per capita for sanitation, US$65 per unit for latrines)

Participant	Contribution up to ceiling	Contribution above ceiling
PROSABAR	70%	0%
Municipalities	10% plus 15% recovered from the community	0%
Community	5% up front plus 15% reimbursed to the municipality	100%

US$70 per capita for water projects because it believed that PROSABAR's costs were too low. All previous Social Investment Fund projects had been larger and more expensive and had used high-level technology. A cost analysis showed that 70 percent of projects without a grant cap policy had cost up to US$100 per capita.

The third set of rules set subsidy ceilings of US$70 per capita for water projects, US$65 per capita for sanitation projects, and US$65 per unit for latrines (table 3.5). The government ultimately adopted this third set of rules as the financial policy for all rural water supply and sanitation investments in Bolivia. Although the per capita costs were higher than recommended by the Bank, the rigor brought to the development and analysis of the financial policy has had an important effect on the sector. The national government will no longer assume the financial burden of very expensive projects. This was also the first time that the government addressed administrative and investment costs in a comprehensive manner. It is anticipated that these rules will be adjusted during the annual review process, and increased efficiency, lower costs, and better information will reduce subsidy ceilings.

Table 3.6 Eligibility criteria for participants and projects

Participant	Beneficiary or subproject criteria
Communities	• Total population is below 5,000. • The community has asked the municipality to include the project in its municipal operating plan. • The community has selected the technology and service level and is fully aware of the cost implications and its financial contributions. • The community is willing to contribute at least 20 percent of the cost below the ceiling and 100 percent of the cost above the ceiling. • Community leaders and municipal authorities have agreed on implementation, financial contributions, and responsibility for operations and maintenance.
Municipalities	• The municipality has proposed a batch of subprojects requested by at least ten communities to the UNASBA. • Subprojects have been included in the annual municipal operating plan following the participatory process. • The municipality agrees to contribute at least 10 percent of the cash cost and to guarantee 15% community contribution up-front. • The municipality makes a commitment to support investment sustainability at the community level.
Departments	• The department has organized its UNASBA and appointed the minimum number of staff required to manage PROSABAR. • The department signs an agreement with DINASBA and the Social Investment Fund for project implementation. • The department commits at least US$100,000 of its annual budget to finance preinvestments.
Subproject	• The subproject follows the participatory process established by the Popular Participation Law. • The subproject reflects the community's desires and willingness to pay. • The subproject is accompanied by a community training and education process. • The subproject follows the DINASBA design manual for rural water and sanitation projects.

Eligibility criteria

PROSABAR established eligibility criteria to maintain equity and transparency, respond to demand, and increase efficiency by grouping projects by region. The criteria were designed to ensure that all primary stakeholders, including communities, municipalities, and departmental governments, were fully committed to the project (table 3.6).

Investment for the first year of project implementation will take place in specific municipalities in Potosi, Chuquisaca, La Paz, and Cochabamba. These departments and municipalities were chosen based on a large unserved rural population and a demonstrated departmental government interest in the project. The project will focus on communities in the Altiplano region during the first year in order to apply the lessons from the Yacupaj project.

After the first year of investment all municipalities will be eligible for financing and will be responsible for consolidating community demands. In addition, any department will be eligible for financing if its corresponding departmental government demonstrates a commitment to the project.

Levels of service

The Yacupaj project showed that an effective project requires the government to develop technical guidelines in order to guarantee quality and prevent overdesign. Because PROSABAR will serve a larger and more diverse population than Yacupaj, it will offer a greater selection of technical options and correspond-

Table 3.7 Technical options for water supply

Technical option	Population density	Service level	Number of people served	System ownership	Responsibility for operations and maintenance
Piped water supply Gravity-fed system	Concentrated	• House connection with or without water meter or regulator • Multifamily standpipe	2,000–5,000	Municipal government	Municipal government or delegated
	Semidispersed	• House connection with or without meter • Multifamily standpipe • Combination house connections and standpipe	500–2,000	Municipal government	Community
	Dispersed	• Multifamily standpipes	0–500 government	Municipal	Community
Pump-fed system	Concentrated	• House connection with water meter or regulator	2,000–5,000	Municipal government	Municipal government or delegated
	Semidispersed	• House connection with water meter or regulator	500–2,000 0–500	Municipal government	Community
Spring protection with multifamily standpipe	Semidispersed/ dispersed	• Multifamily standpipes	5–25	Communal or family	Communal or family
Non-piped water supply Manual pumps with vacated wells	Semidispersed	• Multifamily • Family	5–25	Communal or family	Communal or family
Spring protection	Dispersed	• Multifamily • Family	5–25	Communal or family	Communal or family
Rainwater	Semidispersed	• Family • Communal	Not defined	Communal or family	Communal or family
	Dispersed	• Family	Not defined *family*	Communal or	Communal or family

ing levels of service (table 3.7). Communities select levels of service based on such criteria as population density, willingness to pay, quality and quantity of water source, distance to source, use of water, and alternative water sources. All options receive the same subsidy from the government, so higher levels of service will require larger contributions from the community. Levels of service for sanitation are closely related to levels of service for water supply (table 3.8). Pour-flush latrines and pit latrines will be offered to all communities, but simplified sewer systems only to larger communities. The service levels outlined below were determined by sector engineers, and may not be those preferred by communities.

Sustainability

The rules and processes for PROSABAR aim to treat water as an economic good, creating incentives for communities to choose options for

Table 3.8 Technical options for sanitation

Technical option	Population density	Service level	Number of people served	Water service required	System ownership	Responsibility for operations and maintenance
Conventional sewerage system	Concentrated	House connection	More than 1,000	House connection	Municipal government	Municipal government or delegated
Reduced diameter sewerage system	Concentrated	House connection	More than 1,000	House connection	Municipal government	Municipal government or delegated
Pour-flush latrine	Concentrated	Family	2–0	House connection or standpipe house connection	Family	Family
	Semidispersed	Family				
	Dispersed	Family				
Ventilated improved pit latrine	Concentrated	Family	2–10	Standpipes or pump	Family	Family
	Semidispersed	Family				
	Dispersed	Family				

which they are willing to pay and for institutions to deliver sustainable services in an efficient manner. Sustainability is further enhanced by developing capacity for service delivery and operations and maintenance; determining clear responsibilities for asset ownership; and considering cost recovery options for investment replacement.

Capacity building

Institutions at all levels will benefit from capacity building through PROSABAR.

Government institutions. Planners and decisionmakers from DINASBA will be trained in sector problem analysis, problem solving, policy formulation, and strategy development. Greater awareness of the critical role of women will be promoted and dialogue initiated at the local level. Staffs of the UNASBAs, municipal governments, and PROSABAR will learn about community participation issues, participatory methodologies, and communication and adult education techniques.

Although municipal governments will receive an initial amount of training from the contracted intermediary in facility administration, operations, and maintenance as part of the investment program, long-term linkages will be established with the UNASBA to ensure sustainability. The UNASBAs will therefore provide long-term support to municipal governments in tariff setting, water quality control, system monitoring, and replacement planning and financing, and provide training and technical assistance in administration, operations, and maintenance.

Communities. Most capacity building at the community level will fund activities to ensure the quality, sustainability, and effective use of infrastructure. Intermediary organizations will be contracted by the UNASBAs to assist communities to:

- Ensure participation of all community members in the project
- Select the desired level of service
- Collect baseline socioeconomic and water resource data

- Develop a financing plan for capital and recurrent costs;
- Organize a water committee;
- Undertake hygiene and environmental education;
- Assist and supervise the contractors during construction;
- Train community operators in operations and water quality control;
- Ensure linkages between the community and municipal government.

These activities require interventions in the communities before, during, and after system construction, and require the establishment of trust and confidence between the community and the intermediary.

Water system operators. Although most rural water supply projects in Bolivia train community water committees and system administrators in simple operations and maintenance tasks, these are usually short, intensive courses implemented during construction. PROSABAR will implement a community-level operator certification program to ensure that people being trained have developed the skills required to perform their tasks.

Asset ownership and operations and maintenance

In accordance with the Popular Participation Law, PROSABAR will transfer ownership of assets to municipalities in two stages. First, the UNASBA and the Social Investment Fund provisionally sign over completed works to the municipality. The final transfer takes place once the six-month warranty period has expired, and the intermediary is then paid the last 10 percent of the contracted cost. The social intermediary will continue training the community and municipality in system operations and maintenance during the warranty period. It will also verify the quality of the works and ensure that they are registered in the municipal cadastre so that the municipality has a record of all the water supply and sanitation systems in its jurisdiction.

The municipality will delegate its obligation to administer, operate, and maintain basic infrastructure either to the community or to a third party (such as a private or municipal water authority). Each community or third party is responsible for the works. The community's operations and maintenance committee is expected to submit regular monitoring and follow-up reports to the municipality. Responsibility for handpumps and latrines will be delegated to individual families. The UNASBAs will conduct long-term follow-up.

Adaptive Project Design

Although the project's rules provide the framework for all activities, the project must allow lessons from early phases to be used in later phases. This adaptive project design, which requires continuous review and modification, is essential to the project's long-term success. The project includes the following elements to ensure adaptability:

- ***Flexible design.*** The project allows for adjustments to the rules on financial policy, eligibility criteria, and technological options.
- ***Ownership of project policies.*** The project is using a participatory approach to ensure that major stakeholders gain a sense of ownership. It is essential that these stakeholders support rules that respond to demand and are interested in ensuring that the rules create the right incentives at the community level.
- ***Monitoring and evaluation.*** The system for monitoring and evaluation will assess the project's physical and financial performance, the process itself, and its impact, and will analyze the effectiveness of the rules.
- ***Feedback mechanism.*** Funds have been allocated for regional and national workshops. Regional stakeholders will meet regularly to review implementation procedures and experience, and annual workshops at the national level will analyze policies and impact and recommend adjustments. The International Devel-

opment Association and the government will participate in the annual review.

Monitoring and evaluation is essential at all stages, and the PROSABAR unit will have primary responsibility for it. The UNDP–World Bank Water and Sanitation Program will be funded by the UNDP to assist with this task. The objectives are to provide regular feedback on the project's progress and suggest improvements, estimate economic impact, and develop ways for beneficiaries to measure and better manage changes in their own communities. The monitoring and evaluation activities for PROSABAR have three main components, each of which are linked to monitoring indicators.

Monitoring financial and physical results

Monitoring results regularly will provide information needed for effective project implementation and will assess the function and performance of all participants. Performance monitoring also includes tracking indicators that show the financial and physical progress in achieving project milestones.

Monitoring the process

Monitoring the process includes monitoring of subprojects to provide feedback on project rules, especially financial rules, and on communications between communities and other participants. It assesses whether institutions are cost-effective in carrying out subprojects, and seeks to refine institutional arrangements, training materials, communications support, and operational guidelines. Specific indicators have been developed to evaluate project policies and strategies (table 3.9).

Evaluating impact

This component analyzes the impact of the subprojects on the beneficiary population in terms of economic benefits, human resource development, and community organization. Because these indicators need to be carefully planned and need to include baseline data collection at the household level, they will only be measured in a small percentage of communities.

Lessons from PROSABAR

The main questions are whether PROSABAR responds to demand in communities and to what extent the Yacupaj pilot project contributed to this achievement. Although Yacupaj was essential to the overall preparation of PROSABAR, it could not address all the important issues. For example, PROSABAR's institutional setting is far more complex. It has to work with two national institutions, the Social Investment Fund and DINASBA, and DINASBA itself is subject to intensive supervision from three higher administrative levels. Community requests for services must be channeled and approved by three layers of government: the municipality, the departmental government, and the Social Investment Fund. In addition, at least three intermediaries intervene in each community. In contrast, the pilot project had only one intermediary working at the community level and one institution at the departmental level responsible for oversight. This added complexity may jeopardize the demand-based approach.

The pilot project also had much simpler procurement rules. It did not require an open bidding process, and contracts were negotiated informally. Detailed supervision and administrative control was possible. However, large government- and Bank-funded projects require formal procurement processes. The technical content of projects becomes more complex as well. Engineering designs must be prepared, subprojects appraised, and specialized technical contractors hired.

The PROSABAR experience also demonstrated the need to move quickly in scaling up from a pilot project to a national program. Project preparation was plagued by a series of delays. First, the commitment to the participatory approach took longer than expected, and

Table 3.9 Monitoring indicators for project policies and strategies

Project policies and strategies	
Eligibility and prioritization criteria	• Are communities with the highest demand being served? • Are criteria applied uniformly and equitably? • Is the demand-responsive approach leading to greater sustainability?
Financial policy	• Are community and municipal willingness-to-pay being fully captured? • Are some communities not able to participate because of cost? • What specific contributions are communities making to the project? • Do all participants know the cost-recovery policy for system replacement?
Technical options and service levels	• Are these appropriate to demand and management capacity? • Which service level has been most popular and why? • What are the most efficient techniques for negotiating with communities?
Management at the lowest appropriate level	• Is the community participating in all steps of the project? • Are beneficiaries aware of their long-term responsibility for sustainability? • Are institutional backstopping mechanisms in place to support community and municipal management? • Is intermediation and the community development process cost-effective?

the decision to reform rural sector policy rather than just design the project complicated the project's preparation. Three major government restructuring and personnel changes at the World Bank added to delays during the preparation phase.

But there were also areas where the pilot project proved essential to the preparation of PROSABAR. Yacupaj proved that costs could be controlled and communities could make significant contributions. It also brought more rigor to the analysis of costs in PROSABAR and forced the preparation team to deal with realistic figures. This rigorous financial analysis was the key to establishing a subsidy ceiling for government investment. In addition, it encouraged other sector actors, such as the Social Investment Fund, CARE, UNICEF, and NGOs, to analyze their costs as well.

The pilot project showed the need to focus on capacity building rather than infrastructure. It provided the details of how to generate demand and ensure sustainability. In particular, it had thoroughly tested the main elements of the social component. It developed training materials for community work and methodologies for offering technical options and negotiating levels of service that PROSABAR could adopt.

The rules and policies for the pilot project did not have to be as well-defined as those for large projects subject to appraisal and preinvestment studies. Experiments were therefore easier, and mistakes less costly. In addition, the pilot project did not threaten other sector actors. This inclusiveness helped develop sector consensus and drew in many local NGOs and international agencies that otherwise would have been left out of the planning process.

The pilot project also promoted major investment in the rural water sector. Both the government and the Bank felt more confident developing a large program after the pilot project and the institutional presence of the UNDP–World Bank Water and Sanitation Program in Bolivia.

Conclusion

This study has important implications for the development of large rural water and sanitation projects. The main lesson is that sustainable, demand-driven investments require a coherent set of rules that provide the framework for financial policy, eligibility criteria, levels of service, and responsibility for service delivery and operations and maintenance. The rules must create the right incentives to ensure that beneficiaries choose services that they want, and for which they are willing to pay.

The reform of the water and sanitation sector in Bolivia has demonstrated that a well-designed pilot project can provide the basis for larger investment programs. The pilot project must include stakeholders in the participatory process and incorporate early lessons into later phases and ultimately into the large program. This approach must include explicit measures to ensure an ongoing review. The rules and strategy must be tested and refined with the project in mind.

The Yacupaj-PROSABAR story is far from complete. Yacupaj brought new issues to the forefront of policy development in Bolivia: cost effectiveness, demand driven investment, government facilitation, the use of intermediaries, the participation of women, and hygiene education. By raising sector staff's consciousness on these issues, Yacupaj helped lay the groundwork for development of a national policy. PROSABAR built on the success of Yacupaj to establish rules for all government-financed rural water supply and sanitation investments in Bolivia, taking into account government policy changes such as the Popular Participation Law and decentralization reforms. This has been a major step toward reforming the sector as a whole.

It is too soon to fully evaluate either project, however. Yacupaj ended a year ago and PROSABAR is just entering its implementation phase. Both projects must ultimately be judged by their success in delivering services to Bolivia's poor on a sustainable basis.

Bibliography

Bustillo, María C. 1991. "Validación y sistematización del proceso de capacitación del Proyecto Yacupaj." UNDP–World Bank Water and Sanitation Program, La Paz.

Castrillo, Marcelo. 1994. "Evaluación del impacto en la comunidad del Proyecto Yacupaj." UNDP–World Bank Water and Sanitation Program, La Paz.

Garn, Michael. 1995. "An Institutional Framework for Community Water Supply and Sanitation Services." Paper presented at Collaborative Council Working Group on Institutions Meeting.

Grinspun, Alejandro. 1995. "Social Funds: Fertile Ground for South-South Cooperation." *Cooperation South* (May): 19–23.

Noth, Richard. 1991. "Estudio de las políticas y del marco institucional del subsector." UNDP–World Bank Water and Sanitation Program, La Paz.

Noth, Richard, and Oscar Aguilar. 1992. "El proceso de institucionalización a medio término del Projecto Yacupaj." UNDP–World Bank Water and Sanitation Program, La Paz.

Picciotto, Robert, and Rachel Weaving. 1994. "A New Project Cycle for the World Bank?" *Finance & Development* (December): 42–44.

Projecto Yacupaj. 1993. "Tres estudios de caso en comunidades implementadas." UNDP–World Bank Water and Sanitation Program, La Paz.

———. 1990. "Project Document." Project of the Government of Bolivia. UNDP.

———. 1992. "Análisis de la experiencia de la implementación de la estrategia, del área social." UNDP–World Bank Water and Sanitation Program, La Paz.

———. 1992. "Costos de las opciones técnicas del Proyecto Yacupaj." UNDP–World Bank Water and Sanitation Program, La Paz.

———. 1994. "Eficacia del proceso de implementación del Proyecto Yacupaj a nivel comu-

nal." UNDP–World Bank Water and Sanitation Program, La Paz.

———. 1994. "Informe de evaluación final del Proyecto Yacupaj." UNDP–World Bank Water and Sanitation Program, La Paz.

Quiroga, Marco. 1995. "Guía para la implementacion de proyectos de agua y saneamiento en comunidades rurales dispersas." UNDP–World Bank Water and Sanitation Program, La Paz.

Saavedra, Jorge. 1993. "Evaluación del uso de letrinas en el Proyecto Yacupaj." UNDP–World Bank Water and Sanitation Program, La Paz.

Sara, Jennifer, Betty Soto, Marco Quiroga, and Rafael Vera. 1993. "Proyecto Yacupaj: Análisis de dos años de experiencias de los proyectos demostrativos." UNDP–World Bank Water and Sanitation Program, La Paz.

Soto, Betty. 1994. "Participación Comunitaria Técnicas SARAR." UNDP–World Bank Water and Sanitation Program, La Paz.

———. 1994. "Estrategia social, lecciones aprendidas." UNDP–World Bank Water and Sanitation Program, La Paz.

———. 1995. "Yacupaj: Sustentabilidad de los servicios de agua y saneamiento." UNDP–World Bank Water and Sanitation Program, La Paz.

Soto, Betty and Virginia Chamacero. 1994. "Rol de la mujer en los sistemas de provisión de agua." UNDP–World Bank Water and Sanitation Program, La Paz.

Soto, Betty, Luz Gonzales, and Néstor Goytia. 1994. "Promotor comunal." UNDP–World Bank Water and Sanitation Program, La Paz.

Srinivasan, Lyra. 1990. "Tools for Community Participation." PROWWESS/UNDP, New York.

World Bank. 1995. Staff Appraisal Report 14490-BO. (December 15), Washington, DC.