WATER AND SANITATION FOR HEALTH PROJECT

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FINAL EVALUATION OF USAID/CATHOLIC RELIEF SERVICES WATER AND SANITATION PROGRAM IN ECUADOR, PERU, GUATEMALA, HONDURAS AND THE DOMINICAN REPUBLIC

WASH FIELD REPORT NO. 201

JANUARY 1988

Prepared for
the Office of Private and Voluntary Cooperation,
U.S. Agency for International Development
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under WASH Activity No. 262

by

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This final evaluation of the USAID/CRS Water and Sanitation Program in Ecuador, Peru, Guatemala, Honduras, and the Dominican Republic was prepared by the team of Oscar Larrea and Rose M. Schneider and the team of Richard Duncan and Homero Silva under the direction of WASH Activity Manager J. Ellis Turner.

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LIST OF GENERAL ACRONYMS

AID	United States Agency for International Development (Washington)
CRS	Catholic Relief Services
FVA	AID's Bureau for Food for Peace and Voluntary Assistance
O&M	Operations and Maintenance
PVC	FVA's Office of Private and Voluntary Cooperation
PVO	Private Voluntary Organization
USAID	United States Agency for International Development (overseas mission)
WASH	Water and Sanitation for Health Project

EXECUTIVE SUMMARY

This report presents a final evaluation of a joint USAID/Catholic Relief Services (CRS) Water and Sanitation Program implemented in five Latin American countries: Ecuador, Peru, Guatemala, Honduras, and the Dominican Republic. The program was funded by a matching grant agreement between CRS-New York and AID's Office of Private and Voluntary Cooperation (PVC) for a total of $2,475,000 during the project period from 1 January 1984 to 31 December 1986.

Catholic Relief Services has been working in Latin America to install water supply and sanitation facilities. This matching grant program chose the five aforementioned countries for project implementation in order to improve health and living conditions in selected poor and isolated populations. The goal of the program was to install water and sanitation facilities in 100 communities.

CRS coordinated the projects using local counterparts, who became the project holders and assumed much of the responsibility for project management. The program is implemented through close cooperation between project holders and the communities to carry out water supply and latrine construction and maintenance, and includes a health education component.

In September 1986, nearing the end of the project period, the Water and Sanitation for Health (WASH) Project was requested to conduct a final evaluation of the project. AID's Office of Private and Voluntary Cooperation (PVC) requested the evaluation assistance which was funded by AID's Office of Health, Bureau for Science and Technology.

The WASH Project provided two teams of evaluators, which each included an engineer and health education specialist, to conduct the evaluations based on technical, socioeconomic, and organizational criteria. One team carried out the assignment in Ecuador and Peru, and the other team assessed the program in Guatemala, Honduras, and the Dominican Republic from October to December 1986.

Based on meetings in the countries with USAID and CRS officials and project site visits in each country, the teams drew numerous conclusions and presented recommendations. The following summarizes some of the major points of the overall CRS program in the five countries:

General

The evaluation teams found the CRS program to be well targeted to communities that are in need and unlikely to obtain other sources of assistance. The program meets the overall objectives of the matching grant program and is generally well managed.

The evaluation teams recommends that USAID continue to fund similar programs with CRS for the construction of water supply and sanitation projects. Areas for improving the CRS program are noted below and in more detail in the specific country field reports.

Technical

1. System design, technology and level of service are generally adequate to provide sufficient amounts of water. Standards used varied from those of government authorities to those of project holders to those developed by CRS itself.

   The team recommends that CRS continue to use the simple, low-cost construction standards generally used by a country's water authority, but emphasize the importance of selecting criteria for small communities to avoid the potential for overdesigning a system.

2. The development of operations and maintenance capabilities were stressed to varying degrees in the different countries, but were not always adequate. Communities seemed willing to cooperate for maintenance and there was usually a community member able to carry out some repairs.

   CRS should develop a standardized curriculum for operations and maintenance training programs to ensure adequate maintenance for all facilities.

3. Water and sanitation education activities were promoted at the community level, coordinated with construction activities. A CRS staff member with experience in health education was not hired at the New York or country levels, so this component of the project varied depending on the involvement of the project holders and the interest of the communities.

   CRS should make more of an investment in time and money to develop curricula and training materials for health education activities.

Socio-economic

1. Project communities are selected based on their isolation and need and their ability to organize and actively participate in the construction, operations and maintenance of water and sanitation facilities. There are no standard criteria for selection, but criteria are established in each country by project holders or CRS. Although the criteria vary, they are well applied and clearly defined.

   The team recommends that CRS continue to work with these project communities and locate other communities that need such assistance by establishing more standardized selection criteria.

2. Due to CRS's ability to work with counterpart organizations and to reach isolated communities, the project has increased access to low-cost water and sanitation services for a number of poor, rural communities.

   Increased USAID funding is recommended to support CRS efforts to extend this program to more communities.

<u>Organizational</u>

CRS water supply and sanitation project management staff have varied experience and were often available only on a limited basis. Little effort was made to develop these human resources. CRS project management, therefore, ranged from informal and voluntary to quite structured, with more emphasis on administrative matters and less on technical issues. A great deal of autonomy was given to project holders in each country and their management was generally good.

CRS should attempt to standardize the criteria for selection of water supply and sanitation project management personnel to provide consistent project supervision. Selected personnel should be trained in critical areas and there should be an effort to bring together CRS project staff and project holders for courses and conferences to share experiences and efforts. CRS could develop a standardized, simple, more structured management and monitoring system with indicators to measure administrative and technical progress.

Chapter 1

BACKGROUND

1.1 Introduction and WASH Involvement

In September 1986, USAID's Office of Private and Voluntary Cooperation (PVC) requested assistance from the Water and Sanitation for Health (WASH) Project to conduct a final evaluation of the USAID/Catholic Relief Services (CRS) matching grant water and sanitation program (PDC-0135-G-55-3164-00). The program had received approximately $1.75 million in funds from USAID and included projects in five countries: Ecuador, Peru, Guatemala, Honduras, and the Dominican Republic. WASH provided two teams of evaluators, one for Peru and Ecuador, and a second team for Honduras, Guatemala, and the Dominican Republic. This report represents the findings and recommendations of the evaluators for each of the five countries visited (see Appendices A through E for specific country information) as well as the findings and recommendations of both teams concerning the overall USAID/CRS program for all five countries.

Funding for the evaluation of the USAID/CRS program was provided by USAID's Bureau for Science and Technology, Office of Health through the WASH Project (under Activity No. 262).

The evaluation was carried out from October through December 1986, by two two-person teams provided by WASH. The evaluation included a project team briefing in Washington, DC, document review, field interviews, and site visits. One team, comprised of Oscar Larrea (Sanitary Engineer) and Rose M. Schneider (Health Education Specialist), evaluated the projects in Ecuador and Peru; the second team of Homero Silva (Sanitary Engineer) and Richard Duncan (Evaluation/Community Development Specialist) evaluated the projects in Guatemala, Honduras, and the Dominican Republic.

Each team, in its respective countries, assessed the projects' progress to date, and identified and made recommendations for future project activities. The teams presented their findings and recommendations to CRS and USAID staff in debriefings prior to departure from each country. A debriefing for WASH, CRS-New York and AID staff was carried out in mid-December by the two teams in the WASH office in Arlington, Virginia.

1.2 Purpose of the Program

Lack of sufficient water, poor personal hygiene and poor community sanitation are widespread in the rural areas of the countries included in the USAID/CRS matching grant program. Water is often drawn from sources a half hour or more from the community. Women and children usually walk these distances at least once daily to obtain water, which, due to various factors (i.e., animals drinking from the source, stagnation, etc.) may be polluted and unsafe except by repeated boiling (which is infrequently and improperly done in the home). Communities often lack sanitation facilities: there are few, if any, latrines, no garbage disposal, and little understanding of personal and family hygiene.

Statistics show a widespread need for improved water and sanitation in these countries. Ecuador lacks safe drinking water for over 58 percent of its population, Honduras 54 percent, Peru 52 percent, Dominican Republic 45 percent and Guatemala 60 percent.

The CRS Water and Sanitation Program was funded by a matching grant, signed on December 28, 1983, by CRS-New York and the AID Office of Private and Voluntary Cooperation. It was originally scheduled to take effect on September 1, 1983, with a budget of $2.5 million ($1.25 million CRS; $1.25 million AID) for a three-year period, to complete 100 water and sanitation projects. An early 1984 amendment established the effective project period as January 1, 1984, to December 31, 1986. A later amendment reduced the budget by $25,000 for a total figure of $2,475,000.

The purpose of the matching grant water supply and sanitation program is to improve the health and living conditions of selected poor and isolated populations in five countries in which CRS is already working, by working closely with communities to install and maintain water supply and sanitation facilities. The program focuses heavily on the organization of the project communities to carry out water supply and latrine construction and maintenance, and includes health education related to water and sanitation.

The matching grant's goals also include strengthening the capability of CRS-New York and CRS field offices to plan and implement water and sanitation projects.

1.3 Program Organization and Scope

CRS has been actively operating relief and development programs in Latin America since the 1950s. CRS has a staff of about 30 Americans in Latin America and employs about 50 local and international people.

Generally, these projects have been carried out in conjunction with local counterparts such as CARITAS, church-affiliated social action agencies, and private organizations that work with the poor toward achieving social and economic progress. CARITAS is a local organization created by the Catholic Church in each country to carry out socio-economic programs of development and relief. All the CARITAS organizations are linked under the umbrella organization, Caritas Internationalis, located in Rome. In almost all these countries, CRS has an agreement with the host government which enables it to carry out its operations, within the broad parameters of country plans.

Total CRS staff for Latin America is about nine people. Besides field-level staff, the Latin American operation is supervised by two New York regional staffs, one for South America and the other for Central America, the Caribbean, Mexico, and Panama. The regional offices work in close cooperation with each other.

CRS implements the projects either directly with its field staff or through project holders, i.e., local organizations or organized community groups which CRS guides and monitors. Technical and managerial guidance is provided to the project by a CRS staff engineer in New York.

CRS-New York data as of October 1986 established that, for the water component, 83 projects involving 157 communities were serving 93,301 beneficiaries at a total cost of $3,288,697, of which CRS contributed $2,045,784. Table 1 presents summary data on the water projects. Contributions from the communities are not noted in the summary data. No comparable data were available for the sanitation or health education components.

Project funds are provided for several feasibility studies, construction, initial operation and maintenance, personnel salaries and support, travel, technical assistance, vehicles, equipment, and materials.

1.4 Implementation Strategy

CRS implemented its projects in each country using a strategy which best responded to these communities' needs and structures as well as CRS's own local organizational structure there. In most of the countries, CRS selected and worked with project holders: local organizations (including some government agencies) or organized community groups. CRS established guidelines and procedures and provided assistance to the project holders during the planning, organization, construction, and community education phases. The project holders were responsible for the day-to-day activities, community organization, supervision of construction, and initial maintenance, community health education, and preliminary report writing. CRS in-country staff were responsible for project monitoring and for writing reports for submission to CRS-New York.

In other countries, the in-country CRS staff selected and worked directly with the communities to organize themselves, to construct and initially maintain water and sanitation facilities, and to implement water and sanitation health education activities. In some project countries, a full-time project director was hired, while in others, a single staff member dedicated a percentage of his/her time. A third method of project management was that several in-country CRS staff members dedicated portions of their time to jointly manage the projects.

In some cases, the water and sanitation projects were developed as one component within larger integrated community development projects being implemented by CRS, the project holder, or another institution. In general, the interaction with national public water and sanitation projects was not developed in depth.

Table 1

SUMMARY OF USAID/CRS
MATCHING GRANT PROGRAM

Country	Number of Systems Constructed	Number of Beneficiaries	Total Cost[1]
Ecuador	20	11,445	$ 825,528
Peru	17	35,665	766,114
Guatemala	23	19,855	849,185
Honduras	18	11,231	592,746
Dominican Republic	5 [2]	15,105	255,124
T O T A L	83	93,301	$3,288,697

[1] Includes matching grant funds plus additional CRS funds.

[2] Includes approximately 80 smaller systems.

Chapter 2

EVALUATION

2.1 Purpose

In an effort to ensure CRS compliance with the objectives of the matching grant and to provide information for CRS to direct its water and sanitation projects during the latter half of the eighties, AID (FVA/PVC) and CRS requested a WASH evaluation of the three-year matching grant program. The objective of the evaluation is to assess the quality of the CRS water projects in terms of technical, social, and organizational aspects, as well as to identify successful programming thrusts that offer the potential for replicability in other areas.

2.2 Scope of Work

The proposed scope of work for the WASH evaluation teams was as follows:

A. Technical

1. Evaluate the design and construction of the CRS-sponsored water systems.
2. Determine whether sufficient quantities of water are available for users and whether the systems receive adequate usage -- making recommendations to improve problems of insufficient or excessive usage.
3. Assess the water quality situation and make recommendations regarding appropriate responses to any identified problems.
4. Assess water systems and pumps regarding ease of operation and maintenance and the ability of the group charged with maintenance to carry it out.
5. Evaluate the durability of the systems and the likelihood of their functioning throughout the design period of 20 years.
6. Evaluate the design and construction of the sanitation component.
7. Evaluate the design and implementation of the health education component.

B. Socio-economic

1. Evaluate the impact on community organization and the ability of the community to carry out spin-off activities. Identify potential spin-offs if possible.

2. Evaluate the operations and maintenance plan developed by the community and the ability of the community to follow it. Assess the appropriateness and adequacy of the collection of users fees and the ability/willingness of people to pay.

3. Recommend improvements in the creation of systems for dealing with operations and maintenance.

4. Assess the sanitation component of the projects, especially whether people understand the need for improved water supply and sanitary services. Assess potential continuation of health education at the project site.

5. Assess latrine usage and reasons for lack of use where this is a problem.

6. Evaluate the organizational strength of the water committees and their ability to manage ongoing aspects of the water projects and recommend improvements.

7. Recommend follow-up activities which could be undertaken to improve people's use of water systems or which would improve the delivery of basic health education.

8. Identify constraints to improved health in the communities and to poor water usage and make recommendations.

9. Assess effects which have resulted from the water and sanitation projects.

10. Assess projects in terms of costs vs. effectiveness and comment on the opportunity costs involved in the projects.

C. Organizational

1. Assess overall operation of the matching grant (especially counterpart performance) in the five countries and evaluate CRS staff satisfaction with this type of funding mechanism.

2. Evaluate the CRS approach in developing water projects and recommend how programming could be improved. Identify both strong and weak programming thrusts and suggest guidelines to assist CRS in its future programming.

3. Assess the grant's effect on CRS's commitment to and capability in water and sanitation programs.

2.3 Methodology

2.3.1 Team Composition

CRS requested the services of two WASH teams, one to visit Central American/ Caribbean countries and the other, South America. One team was responsible for the evaluations in Guatemala, Honduras, and Dominican Republic. The second team assessed the programs in Peru and Ecuador.

2.3.2 Team Planning Sessions

On October 14 and 15, just prior to their departure to the field, the two teams participated in a team planning meeting at the WASH office. Among the outcomes were

- an opportunity for team members to become acquainted and share backgrounds, experience, motivation, perceptions, and expectations of the assignment;
- a common understanding of the assignment and how it fits into broader program and project activities;
- identification of the clients involved in the assignment, understanding of their relationships and interests, and a clear sense of how the consultant teams fit into this picture;
- clarity of team and individual scopes of work to ensure agreement and understanding by the team members;
- a realistic work plan for implementing the assignment;

- a well-defined end product;

- agreement upon norms for working as a team; and

- understanding and agreement on the role of the team leader and team members.

During the team planning meeting a well-defined preliminary table of contents for the end product was prepared. Also, individual country work plans for each team were developed and agreed upon.

2.3.3 Meetings with USAID and CRS Missions in Each Country

Following the team planning meeting, the consultants traveled overseas and met with USAID and CRS officials in each country to discuss the purpose and scope of work and the preliminary country work plan. During these meetings the CRS contact officer was introduced to the consultants and arrangements for interviews with institutions and private voluntary organizations (PVOs) were made. The work plan for site observations was then revised as appropriate.

2.3.4 Field Observations

The actual field observations were accomplished following initial meetings with CRS staff in each country.

Before leaving each country, the WASH team prepared a draft report containing the most important findings and recommendations. Copies of the draft report were presented to USAID and CRS officials during a debriefing meeting.

Chapter 3

CATHOLIC RELIEF SERVICES PROGRAM APPROACH

3.1 Introduction

Within the matching grant objectives and purposes, CRS has attempted the difficult process of adhering to some basic principles and policies for the program and still meeting the diverse requirements dictated by country geographic, cultural, and institutional circumstances, as well as the special circumstances of its own staff in each country.

Part of the innovative thrust of the program is based on these wide ranging needs, and part results from the CRS policy determination to experiment with new approaches to the planning and implementation of water projects for small, underserved, isolated communities.

The underlying concept is the notion to serve remote and neglected communities by assisting them with the capital costs to supplement their own efforts in achieving the benefits of a water system. The benefits are conceived broadly. They include not only the creation of a convenient and plentiful supply of water, but also improved community organization, better sanitary conditions, health awareness and knowledge, and new attitudes and behaviors, as well as increased capacity of the community to analyze, determine, and attend to its needs.

The objectives and policies conform to the notion that the program will necessarily be small, but assume that it will provide the information necessary for future expansion and improved CRS programming. It is also hoped that the program will demonstrate an inexpensive approach to self-sustaining systems with the potential for long-term operation.

The approach includes a particular style of programming and project development. Each CRS country mission is able to analyze its own situation and determine which areas are isolated and how they can be best served using available resources. Involvement with the Catholic network and private or government agencies is encouraged, to respond to community requests and assist in project implementation. CRS policy encourages both innovative strategies and practical orientations toward the fundamental principles of the program. While central approval of each project is required, the review process is open and expeditious.

In addition to need and isolation, community selection was designed both to take advantage of emerging local organizations and to use water projects to generate organizational capacity, initiate or reinforce health education, and promote the multiplier effect either through community interaction or capacity to attract support from other sources.

The essence of the approach to design and construction is in determining the minimum level of design that will provide clean water and still allow for effective participation of the community. One of the implicit objectives of the program is to find that balance through the use of different approaches adapted to the different country situations. In similar ways the program is open to a variety of construction methods as long as the driving force in the process is community participation and action.

Operations and maintenance policies focus on the building of community capacity for a self-sustaining system. This approach aims to provide the skills required to some or all of the members of the community, as well as management skills that will allow the community to engage in other technical activities without excessive dependency on outside assistance.

Training approaches also vary by country, but the emphasis in all has been one of practical on-the-job and community-based training that would build local capacity to solve community problems.

The concept that water projects must include awareness of sanitary practices and health knowledge is also an integral part of the program orientation. However, it was expected that individual CRS missions could determine the best way to include this component in the projects. The approach allows for the support of established and ongoing health programs and the attempt to promote organizational development in communities which had very little initial capacity.

The management pattern includes a conscious effort to delegate authority to those nearest the project operations and a willingness to rely on informal reporting at intervals of time somewhat longer than is usual for these types of projects.

There is a realization that the approach is risky and open to many pitfalls; however, the program is willing to undertake projects in order to find innovative approaches to both community development and water supply.

3.2 Community Selection Criteria

The common elements of the community selection criteria are the following:

- the community has a recognized and unfulfilled need for water;
- the community is isolated and not likely to be served by other programs;
- a source of water has been located which will be adequate and available at reasonable cost;
- the community has the rights to the water and attendant areas;
- the community is organized and capable of installing the system; and
- it is willing to participate in the training and education programs which will be made available.

Each of these criteria are given different emphasis in each country according to the nature of individual programs, but they constitute the major yardstick by which approval in New York is measured. Both field and headquarters personnel can vary these criteria if a particularly innovative or effective approach appears to justify an exception.

In practice, the evaluation teams have found that the initiative for selection tends to come from the communities themselves, through project holders or through church groups once the areas of concentration or particular criteria have been established in each country. There are cases in which communities that have limited organizational capacity are assisted, but generally those communities which have functioning organizations, some leadership, and the capacity to articulate their needs are selected.

3.3 Design and Construction Criteria

Some country programs use national design and construction standards and others use modified standards or develop their own. In one case (Dominican Republic) CRS simply arranged for a reputable engineer to deal with the analysis and design problem. In other countries project holders or CRS staff apply national or other generally acceptable standards.

Construction criteria are heavily influenced by the community capacity in each country. In one country a CRS engineer provides detailed supervision or hires a master mason to supervise the process. In another an experienced technician uses his experience and creativity to solve the various construction problems with the community participating in the process.

3.4 Operations and Maintenance Practices

In all cases the community is responsible for the operation and maintenance (O&M) of the system. In some systems there is recourse to the technician or the project holder in case of the need to obtain initial spare parts or advice on serious problems. In others it is expected that the community members will be able to finance and maintain the system by themselves from the start. There may be a special designated and trained person who is responsible for maintenance, or the entire community may have been trained and either rotate responsibility or have everyone prepared to assist in both preventive maintenance and repair as needed.

3.5 Training

Technical training is essentially done on the job and is provided during the construction phase. In some cases special training for maintenance and repair is provided. However, given the simple systems and the process of construction, this training is usually informal.

Organizational training is incorporated into the process by which the community implements the construction and operation of the system. Country variations are significant. Some project holders design elaborate systems of lectures and group process. Others depend on the informal problem-solving approach as organizational problems arise during the construction. A third system assumes that the community has adequate organization in order to qualify for the project and that in the process of dealing with the practical aspects of construction and maintenance, will improve its capacity or request such assistance as needed. Most programs assume that there is little need for continuity in this training.

Health education training may be accomplished by the selection of communities which already have an ongoing program. That program is then reinforced with targeted training using existing resources and by adding a highly visible project to bring water to the village.

Some country programs insist on having community-based health promoters and provide either short-term or continuous training and follow-up for the delegated person.

Health promoters may be trained at a national institution or a local clinic. Some programs contract for health education promoters to work specifically on CRS projects. In other cases, project holders have procedures for community training or centers at which information, training, and awareness building are an established and continuing part of the program.

Essentially the program accepts a wide variety of training formats and locations, but both organizational and health education training in some form are included or supported in the project design and implementation.

3.6 Health and Water and Sanitation Use

The program puts some emphasis on incorporating efforts to provide the materials and the knowledge that will ensure that the beneficiaries not only have water but have an understanding of its use and of the relationship between water and health.

The program envisions this process to be the result of community action, training, and the utilization of available resources provided by the project or other programs.

The program process normally includes determining how health education and sanitary practices will be included in the implementation of the project. It assumes that the planning of the project will involve a strategy for improving the health conditions of the community and for community action to ensure the proper use of water. It also envisions the introduction of latrines and sanitary education emphasizing understanding and behavior changes related to the health and sanitary practices where they are not already understood.

Strategies combining community-based training, a health promoter, the utilization of health education training institutions, and the distribution and use of educational materials are an expected part of the planning and implementation process.

3.7 Administration and Management

The management style which the program envisions is one of central involvement rather than central control. While New York Headquarters reviews and approves each project individually, there is significant informal consultation and considerable flexibility in the project approach. As long as the basic community-oriented criteria are included, innovation is encouraged in the planning and management of project implementation. For example, both solar and wind technologies have been accepted, as well as gravity systems and wells (with pumps).

Information systems are informal and the delegation of responsibilities is broad at both the central level and the field level. Reliance on formal reporting, except for financial control, is minimal. Both the project director from New York and CRS field officials are frequent visitors to the project for the purpose of facilitating the implementation of the project and learning about existing problems.

There has also been much discussion of the advantages and disadvantages of delegating both design and administrative responsibilities to regional, and often, to the village levels. There is considerable value in looking at the results of the process even after the short period of two years.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS ON OVERALL CRS PROGRAM IN THE FIVE COUNTRIES

4.1 Community Selection and Participation

Conclusions

In its overall approach, CRS has selected, either directly or through project holders, a number of communities which are isolated and in great need. At the same time, the communities have the basic structure and potential to allow them to be organized and work together to construct, operate, and maintain water and sanitation facilities.

An overall set of criteria for CRS community selection was not apparent; in general, poor, isolated, small, often rural communities with limited services and contacts with other agencies were appropriately chosen.

Overall, community participation was unusually active. High interest levels were followed by work with CRS staff or project holders to plan, purchase supplies, construct, operate and maintain systems, and keep records. Women participated more actively than is usually found in larger projects; this participation appeared to significantly affect the projects' success.

The community showed more active participation and interest in the water system construction than in construction of latrines and changing of sanitary habits. Participation in operation and maintenance was favorably high.

Recommendations

CRS should continue to work with these project communities to extend development activities. In a future phase, CRS could search out communities which need more intensive assistance in organizing and constructing water and sanitation projects. This would imply an even stronger community development approach to bring less organized communities to a point of readiness for participation.

4.2 System Design and Construction

Conclusions

Simple design, appropriate technology, selection of level of service, and construction in general are adequate, and as a result, sufficient amounts of water are provided in most communities.

National standards for construction of water facilities were often used. Design criteria for sanitation facilities were rarely standardized or did not exist in many cases.

Water system project development does not yet include regular, adequate testing for water quality. Standards for treatment and regular implementation of these standards were not found to be adequate; although water quality appeared to be adequate, without testing, the quality of water supplied cannot be guaranteed.

Recommendations

When flexibility exists in the selection of design criteria, CRS should select criteria that are more appropriate to isolated, small communities to avoid the higher cost of overdesigned systems.

CRS should continue to use the simple, appropriate, low-cost water system construction standards generally used by each country's water authority. Standards for latrine construction should be developed and emphasis placed on their use.

4.3 System Operations and Maintenance

Conclusions

The degree to which CRS diligently stressed the importance of an adequate operations and maintenance scheme from the early planning stages varies greatly by country program. Programs range from a well designed and implemented comprehensive operations and maintenance program in Ecuador to a limited "add-on" approach to O&M in Honduras.

Communities are willing to contribute to O&M costs and to be trained to assume the responsibility for repair and maintenance. In many sites the training given does not adequately prepare villagers for the O&M tasks at hand. When training was provided, chlorination and flushing of systems (after construction) were not included. Limited technical input in designing the training and lack of accessibility to some isolated communities has constrained O&M activities.

Recommendations

A CRS commitment to further development of adequate operation and maintenance is needed. CRS should develop a standardized curriculum for O&M training programs. In addition, CRS should seek out and work with local agencies or groups that could provide O&M training for rural communities. The Ecuador model could be built upon, with technical assistance used to strengthen training and materials development. Initial and follow-up training should be funded as well as provisions made for basic O&M equipment and supplies.

4.4 Human Resources Development

Conclusions

The selection of CRS project staff to manage the water and sanitation projects varied greatly. In some countries, a full-time CRS project director was hired while in other countries the responsibilities were shared among several staff members. In still another, one person dedicated a limited percentage of his time to water project management. The type and quality of CRS project management had a significant effect on water and sanitation project implementation.

CRS in-country staff did not take a direct role to guide the selection of project holder personnel through either discussions or assistance in developing job descriptions.

Training CRS staff or counterpart project holders through courses or conferences for interchange, or by supplying them with resource material was not a significant part of the CRS program. Although dedicated, hard-working project holder personnel were recruited, they did not always have the specific skills required for their roles.

Recommendations

In the future, CRS could attempt to standardize the criteria for selection of water supply and sanitation management personnel to provide consistent project supervision. CRS could also assist project holders to design job descriptions to guide hiring of staff.

Training of CRS project staff and counterparts should be developed as an integral part of project development. A kick-off conference to establish overall standards and criteria, periodic training and information interchange, and periodic technical assistance are needed to increase the quality of projects, promote communication, and increase motivation and information exchange.

4.5 Health, Sanitation, and Water Use Education

Conclusions

In general, CRS implemented its health, water, and sanitation programs within a broad community development and health education approach, which sometimes was developed by another agency (a diocese, a community development organization, or an indigenous PVO). Water and sanitation education activities were promoted at the community level using hired (project holder or specialized health education organizations) health education (H.E.) promoters or community volunteers. Some programs used an approach which consisted of sporadic visits; others conducted a series of planned regular visits. In general, the involvement of communities in these H.E. activities was active. In the majority of cases, the H.E. efforts were closely coordinated with construction schedules.

A CRS staff member with experience in health, water, and sanitation was not hired at the central office (New York) or country levels, limiting the technical direction given to H.E. development in the projects. Health, water, and sanitation education was a distinctly weaker aspect of CRS's program compared to construction, operations and maintenance, etc.

Recommendations

Although construction is well advanced, health education in the communities is still needed for the project to be successful. CRS should consider an investment of time and financial resources to develop curricula, training materials, and methods for continued H.E. activities. Contacts with other agencies with similar projects to seek out H.E. materials is needed.

Sanitation as well as potable water needs to be emphasized. A strengthened educational effort is needed to encourage positive behavioral changes related to proper water and sanitation use.

4.6 Administration and Management

Conclusions

CRS's management styles ranged from informal to quite structured. In general, strong, informal relationships with project holders and communities helped provide monitoring information. The CRS assistance and direction was strong during the early project design phase, after which a contract was signed, detailing the project holders' responsibilities. A great deal of autonomy was given to project holders for project implementation. Site visits were not frequent although communication by telephone and correspondence was maintained. A flexible system of project monitoring and reporting emphasized administrative matters more than technical issues. Basic financial reporting requirements were adequate, however, a monitoring system which focuses on progress and outputs is needed.

Recommendations

CRS, in the future, could develop a simple, more structured management and monitoring system with key indicators to measure administrative and technical progress. Interchange with project holders must be expanded and maintained to establish a simple, practical monitoring mechanism which provides indicators for project progress.

4.7 Effects

This project has increased access to water and sanitation services in a number of poor, isolated communities. The quality of water appears to be reasonably good, and environmental contamination has decreased due to latrine construction and sanitation improvements resulting from health and hygiene education.

Community organization, with strong participation from women, has caused these successful communities to organize further to develop broader health and community development activities. It has also helped some communities develop the skills needed to successfully approach banks to obtain agricultural credit. Access to water has allowed some communities to start home gardens, increasing home consumption and income from the sale of their products.

It is expected that certain expenditures for clinic visits and medication will be reduced with lower incidence of gastrointestinal diseases. Increased access to water decreases time women spend in travel to distant water sources; it is expected that the women will use some of the time and energy saved for their own health needs and those of their family. Further health effects can be expected as health habits for water and sanitation improve. Increased health education efforts are needed to bring about significant improvements.

Increased USAID funding is recommended to support CRS efforts to extend the provision of water and sanitation services to poor, isolated communities. The capability of CRS to work with their counterparts to reach isolated communities and work effectively at low cost is recognized throughout this evaluation. The CRS experience and institutional base is an appropriate base for the development of additional water supply and sanitation activities.

APPENDIX A

FIELD REPORT ON EVALUATION OF CRS PROJECTS IN ECUADOR

by

Oscar R. Larrea
and
Rose M. Schneider

APPENDIX A

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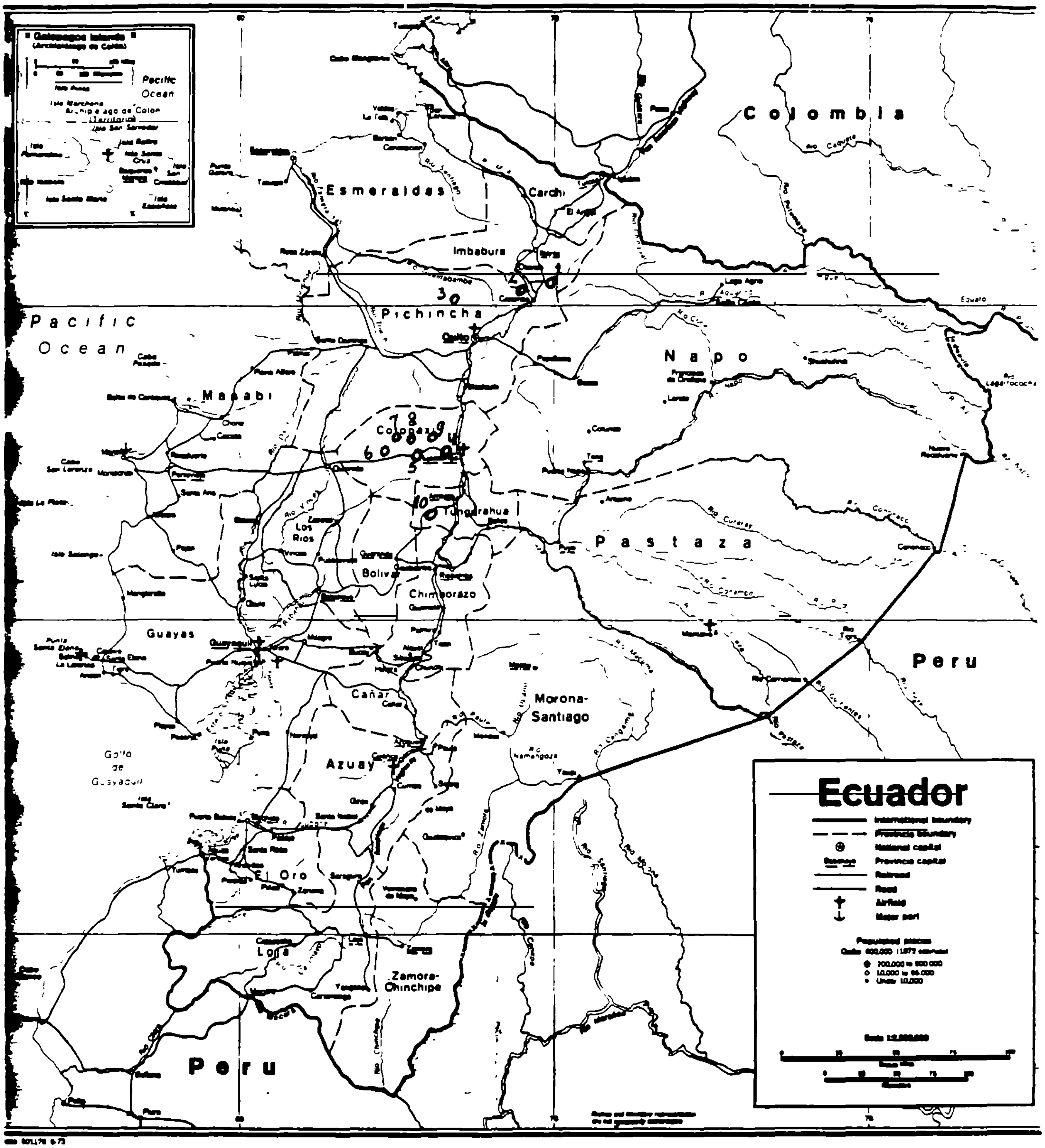
MAP OF ECUADOR



Central Intelligence Agency

1. Simón Bolavar
2. San Miguel de Prado
3. Nieblí
4. San Francisco
5. La Merced
6. San José de Pichol
7. Sta. Rosa de Pichol
8. Toñalá
9. Las Hornas
10. Putugléo

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The WASH team also wishes to thank the community leaders and members who provided valuable information which contributed to this evaluation.

LIST OF ACRONYMS

IEOS	Instituto Ecuatoriana de Obras Sanitaria (Ecuadorian Institute of Sanitary Works)
INERHI	Instituto Ecuatoriana de Obras Hydraulico (Ecuadorian Institute of Hydraulic Resources)
lpcd	liters per capita per day
MOH	Ministry of Health
SENAPS	Sociadad Ecuatoriana Nacional de Asistencia y Promoción Social (Ecuador National Society for Assistance and Social Advancement)

Chapter 1

INTRODUCTION

A WASH team comprised of Oscar Larrea and Rose Schneider traveled to Ecuador in November 1986 for ten days to conduct a final evaluation of the CRS Matching Grant for the three-year water supply and sanitation project funded by USAID's Office of Private and Voluntary Cooperation. Twenty project sites were selected in communities ranging from 75 to 2,500 inhabitants. CRS worked with IEOS, the Ecuadorian Institute of Sanitary Works, and implemented projects using their national standards. Most of the water projects (95%) were gravity fed. Information concerning the number of latrines constructed was not available. Total project costs were stated in mid-1986 figures to be about 98.5 million sucres, equivalent to $825,527 at a rate of exchange of 115 sucres to 1 dollar. Part of the health education component cost, approximately $9,500, was funded from another source (see Annex 1 for cost/project figures).

Upon arrival, the WASH team met with CRS project staff for a very detailed briefing document review. A meeting was also held with USAID staff for water and sanitation and health and nutrition projects. IEOS offices were also visited in order to make contact with its promotion department and study information on health education and community promotion and participation.

The Ecuadorian Episcopal Conference has a training office which provides assistance to CRS as sub-contractor, on health education and community promotion and organization. This is done through the "Secretariado Naciónal de Pastoral Social (SENAPS)" promotion department. Unfortunately, during team visits to SENAPS, the health educator was no longer available.

Site visits were carried out to observe the functioning of water schemes and community organization in selected places as well as construction methods and materials used in other projects. Three systems were visited in Pichincha province: Simón Bolivar, San Miguel del Prado y Niebli; six in Cotopaxi: San Francisco, La Merced, San José de Pichul, Santa Rosa de Pichul, Toñalá y Hornos; and one regional system in Tungurahuas province: Putugleo, which serves 7 communities. During site visits, physical observations of tanks, water sources, piping, water meters and household taps were made and lengthy discussions were held with community leaders and social-work groups. During site visits, physical observations of tanks, water sources, piping, water meters, and household taps were made and lengthy discussions were held with community leaders and social-work groups. A review was also done of the health education materials produced during the project.

After the site visits a debriefing was held with CRS staff and a copy of the draft report was left with CRS before the team's departure.

Chapter 2

PROJECT DEVELOPMENT

2.1 Introduction

CRS has demonstrated an exceptional capacity to mobilize resources to develop self-help programs which benefit poor rural communities. CRS has achieved a high level of community organization, with village members highly motivated to participate in all phases of the water and sanitation projects. All communities visited have demonstrated that they are aware of their responsibilities for the operation and maintenance (O&M) of the systems and of the benefits of better living standards and better health conditions.

CRS has also demonstrated skills in initiating and supporting interagency relationships, organizing communities, planning, designing, and implementing rural water and sanitation schemes with a low capital cost and with high-quality construction practices and responsibility.

2.2 Program Approach

CRS has developed a careful approach to the implementation of water and sanitation projects in Ecuador. The following steps are considered:

- Projects are identified, within CRS objectives, to produce a change in the living standards of poor rural communities.
- Projects must provide safe drinking water of acceptable quality and in sufficient quantities.
- Projects must be low cost and have the active participation of the community and other development agencies.
- The operation and maintenance of the schemes are the responsibility of each beneficiary community through the collection of water fees.
- Projects should produce some spin-off activities.

The approach has proved to be successful in the implementation of CRS/AID matching grant projects.

Chapter 3

COMMUNITY SELECTION AND PARTICIPATION

3.1 Criteria for Selection

CRS criteria for community selection were included in the agreement between CRS and AID for the matching grant implementation which calls for the approval by the Ecuadorian Institute of Sanitary Works (IEOS) of all studies, designs, community selection and other related aspects before a project will be approved. There is also a legal commitment that the Ecuadorian Institute of Hydraulic Resources (INERHI) approve the use of a specific water source for each community in the country.

CRS, during the first year of the matching agreement implementation, adhered strictly to this procedure, submitting to IEOS all requests from rural communities considered for CRS assistance. IEOS took a long time to decide whether a community was qualified to receive water services, to make preliminary studies, and to approve financing under the CRS/AID grant.

Because the implementation of the project was behind schedule, CRS decided to speed up the procedure for the second year by directly contracting for the studies and designs for a number of communities and submitting the design to IEOS for approval. In all cases, CRS adhered to IEOS rural water standards and specifications. Nevertheless, IEOS took a long time to approve designs, which made it difficult for CRS to comply with the matching grant agreement commitments. For the third year, CRS implemented the projects designed with IEOS standards directly, using their standardized structural designs and specifications without waiting for IEOS approval. In all cases, CRS was assured beforehand that the community had INERHI approval for the water source utilization.

In general, CRS criteria for selecting communities to be funded for water and sanitation projects followed a well-defined procedure consisting of the following steps:

Step 1 Evaluation of a community request on the basis of 12 pre-set criteria, which can be seen in Annex 2 (in Spanish). During this stage, CRS studies the request within the overall CRS activities in the country and when a request is selected, goes to Step 2.

Step 2 CRS makes a more in-depth study through the preparation of a survey for each community following the procedure shown in Annex 2.

Step 3 CRS approves the request and signs an agreement with the community using a format, a model of which is enclosed as Annex 2.

CRS criteria for prioritizing projects are based on three main considerations:

1. Legal aspects of water use, which refers to INERHI approval for water source usage.

2. Legal aspects of land use, which refers to property ownership and placement of structures such as intakes, tanks, treatment plants (if any), conduction lines, etc.

3. Community participation in all the phases of the project, including the willingness to build family sanitation facilities. (See Annex 3 for selected community photographs.)

3.2 Communities Selected

CRS selected 20 water and sanitation projects to be funded by the matching grant agreement, with populations ranging from 75 to 2,500 inhabitants and total costs that range from U.S. $6,760 to $162,400 (as shown in Annex 1, Table 1).

3.3 Level of Service and Community Coverage

According to IEOS regulations and standards, rural schemes must have water meters on each house or patio connection that could be upgraded in the future.

3.4 Community Organization and Participation

3.4.1 Committee Election and Involvement

The community is actively involved in the planning, construction, and operation and maintenance of the water and latrine systems. After initial meetings with the project engineer, the community elects a Junta (committee) for Water and Sanitation.

This committee makes visits to CRS and other institutions to arrange legal matters, organizes the community to construct the water and latrine systems and participates in the health education sessions.

The committee is later responsible for the operation and maintenance of the system and for the collection of fees.

3.4.2 Participation of Principal Users

The women, as principal users of household water systems, were actively involved in the construction (digging of trenches, carrying of block, etc.) of water systems and latrines. Most of the systems provide at least one connection per house. Engineers and promoters discuss with household members the placement of the household tap. (CRS donates 10 meters of pipe for the household connection; decisions as to placement are made within this limit). Women participate actively with men in the community discussions on water construction and operation and maintenance. They are sometimes elected to the Junta, the organizational committee responsible for direction of the project. However, household responsibilities sometimes restrict their travel to organizations outside their community to discuss legal and other aspects. Single women appear to have assumed some Junta positions and are generally more able to travel and meet with institutions outside the community.

Despite the active participation of women as principal users, most of the audiovisual materials only portray men involved in water supply and environmental activities.

Chapter 4

SYSTEM DESIGN AND CONSTRUCTION

4.1 Criteria for Water and Sanitation Systems

As discussed earlier, CRS follows IEOS design criteria for rural areas. In general, such criteria include the following aspects:

4.1.1 Source Selection

In general, CRS selected the most appropriate water source for each community, bearing in mind the water quality and capital and recurrent costs of the projects: most systems (95 percent) are gravity fed, among which 79 percent are natural springs and the remainder are surface water.

Water quality testing is performed when source selection takes place and sometimes later during the project life. Regardless of what kind of source has been selected, chlorination is specified for each system using high concentration calcium hypochlorite, HTH-60 percent strength.

4.1.2 Water Quantity

In discussions with the WASH consultants, the CRS engineer indicated that nearly all systems were designed to meet IEOS standard per capita allocations of water and to provide service 24 hours a day. Systems visited showed intakes built to meet community requirements on the basis of the maximum daily consumption.

4.1.3 Source Protection

Also, following IEOS specifications, all water sources are protected to avoid contamination of any kind and to keep the surface running water from infiltrating the source. The WASH team considered the source protection practices acceptable in all projects visited.

4.1.4 Design Period and Population Projection

In almost all cases, IEOS has specified a design period of 20 to 25 years, with a yearly population increase of 2 percent which is based on census data from the past 20 to 30 years.

Population projection is calculated using the geometrical progression method.

4.1.5 Design Criteria

- Per Capita Consumption. CRS and IEOS attempt to provide enough water to support good sanitation habits in the communities. The per capita average daily consumption is estimated to be 50 to 60 lpcd (liters per capita per day).

- Average Day-Water Demand. Water demand for an average day is based on the design population multiplied by the per capita consumption.

- Maximum Day-Water Demand. IEOS selected a maximum day factor from the standards they use for rural areas. This factor is equivalent to an increase of one liter per capita per year for the design population. Water source, intake, reservoir, and transmission line capacity are all calculated using this factor.

- Peak-Hour Water Demand. Distribution systems are calculated for the peak hourly demand in all the CRS/AID matching grant projects. Usually the increase factor is chosen in the 1.5 to 2.0 range. In general, in the communities visited, two peak periods can be observed: from 6:00 to 8:00 a.m. and from 3:00 to 7:00 p.m.

- Water Storage Requirements. IEOS design criteria for rural small water supply systems require that they provide a water storage system equivalent to 35 percent of average day consumption to meet the fluctuation in the community daily demand.

4.1.6 Sanitation System Design Criteria

Improved water seal latrines constitute the standard CRS procedure for disposal of human waste. The "bacinete" or "sanitario campesino," used throughout the project, consists of a seat made of an inexpensive porcelain material and a house made of local materials or those that the household can afford. The hole is made some five or more meters away from the main house; in the communities visited, some of these holes are ventilated, others are not.

Discussions with the CRS project engineer revealed that most of the sanitation component of the projects had been funded by the matching grant except for a part financed by IEOS.

4.2 Materials and Methods of Construction

In general, the WASH evaluators found that the methods of construction and materials used by CRS are acceptable. Local slip-joint PVC pipe is used for transmission and distribution lines with special fittings imported or locally manufactured. Solvent-welded PVC is used for smaller diameters while galvanized steel pipe is used for patio connections and special sections of the transmission line such as shallow river crossings.

All the service connections have a water meter incorporated into the system. This arrangement, in spite of the high initial cost, has a psychological impact on the household because of the personal feeling of security and self-confidence the community people develop when they have a meter on the new system.

Meters used are the volumetric type of two different makes: locally manufactured under foreign license and imported ones.

As mentioned above, methods of construction were found to be acceptable. The following observations were made:

- Excavation of trenches is kept, in general, between 1.0 and 1.2 meters in nearly all kinds of terrain.

- No special bedding practice is applied; however, the bottom of the trench is kept straight and smooth so the pipe can be securely buried.

- There is not a general rule or standard for service connections; it depends on individual criteria set by the Provincial IEOS office. So, in several instances, service lines have been installed using vertical connections to the distribution main instead of horizontal ones. All the service connections should be horizontal to prevent damage and also to encourage households to introduce water into the house or improve the level of service.

- Some of the service connections are appropriately protected by a simple wooden box. This practice must be standardized for the whole project.

- In some cases valves and meters were installed without unions for easy removal. CRS has adhered to the IEOS practices except in those cases where CRS has directly built the system; in such cases designs and construction criteria are standardized.

- CRS has a great deal of interest in providing appropriate technology to improve living conditions of the population involved in the project. As an example, CRS provided a solar heater for the school in one community and is also helping the community build a ferrocement storage tank, which has a lower cost than the traditional concrete tank. Observations on CRS' use of material and construction practices are listed in Annex 4.

4.3 Management

CRS has carefully planned the implementation of the projects funded by the matching grant agreement, and has applied constant pressure on IEOS to get the individual projects under way. Unfortunately, IEOS has not demonstrated the same interest, so as a result, the relationship between CRS and IEOS was modified to meet the objective of the grant agreement.

Several factors contributed to CRS success in implementing the projects. Some of those factors are:

- good planning and scheduling
- high level of community motivation
- community responsibility for materials purchasing and labor contracting using approved CRS/AID funds
- constant field supervision and technical assistance by CRS project manager engineers.

Tables 2, 3, and 4 in Annex 1 give some idea of construction details, technical aspects, and geographical distribution of the projects.

4.4 Financing and Economic Aspects

Community and regional coverage, as well as cost considerations, are particularly important for CRS: projects are intended to cover 100 percent of the population, but the IEOS criteria establishes that the only community people entitled to receive water service are the households that have actually worked on or contributed to the construction of the system. In each community there are a number of households who, for one reason or another, did not participate during the construction and therefore have no right to benefit from the water service. The evaluators estimate that this group represents between 10 percent and 12 percent in the localities visited. Nevertheless, CRS is trying to increase coverage as much as possible. Some aspects are discussed below:

- CRS and AID consider that the regional coverage is of great importance so they assign priority to projects that contribute to increased regional coverages. This is a combined effort with other agencies.
- Five out of the 20 CRS/AID grant agreement projects had IEOS financial support; one had additional AID support; one had support from a Municipal Council; and the rest have been totally financed by CRS/AID funds and the community. See Table A-1 for the financing aspects of the project.
- CRS and the communities agreed that the total O&M cost would be the responsibility of the community through the water committee and IEOS supervision.

- Two projects located in Tungurahua Province are designed to serve several communities, taking advantage of economy of scale by using the same water intake and transmission line.

  The community of Putugleo visited by the WASH team will provide water for seven communities with a total population of 1,971 people. One 50-cubic-meter storage tank was designed and built for three communities; a second 30-cubic-meter tank, for another three communities; and finally one 15-cubic-meter storage tank was provided for the other community.

Table A-1

CRS/AID MATCHING GRANT PROJECT SUPPORT

Selected Community Groups	Project Cost (US)	Project Support (percent)					
		Community		AID	Municipal		
		Labor	Cash	(Supplemental)	Council	IEOS	CRS/AID
4 Projects	$322,548	31.1	2.0			10.7	56.2
1 Project	23,560	27.8		23.2		14.8	34.2
1 Project	80,675	19.5	4.3		24.5		51.7
13 Projects	429,465	21.3	12.1				66.6
TOTAL	**$856,248**						

Note: Total project cost includes supplemental support from other sources, like USAID and municipalities. Also, the total cost differs slightly from the total shown in Table 1, Annex 1, because of different exchange rates used in the calculations.

Chapter 5

SYSTEM OPERATIONS AND MAINTENANCE

5.1 Introduction

The most difficult and important components of rural drinking water supplies are good operation and sound maintenance. In general, these activities are a community responsibility which is performed by a trained community member, full or partially employed and paid by the water committee. CRS has provided a set of good-quality tools and some extra pipes and fittings for each community and some kind of guidance to the operator and committee members on how to perform their duties, how to keep records, etc.

To guarantee continuous service, it is important that regional support be established so each community receives routine supervision and advice and also technical assistance in emergency cases or when a major repair is needed.

5.2 Organizational Aspects

The project engineer/director met with each community to explain CRS project activities. In each case, the community then elected a Junta committee responsible for organization and construction of the water system and latrines. This committee later assumed the responsibility for the operation and maintenance of the systems and the collection of fees.

5.3 Operational Status

The community water systems visited during the evaluation have been in operation for only a few months. One of them (Niebli) has some maintenance problems because the PVC tee used for service connections was apparently of low quality. During the maintenance practices, the operator changed the faulty part to a higher-quality, new PVC tee.

5.3.1 Water Quantity and Quality

For all the projects built under the matching grant program, water quantity measurement and quality analysis were made. In all cases but one, there is a quantity of water in excess of what is needed for the design period; the excess is diverted from the source to other uses.

Community operators and water committees have attempted to maintain a good water quality by periodic cleaning of intakes, reservoirs, pressure reducing tanks, etc., but the distribution systems are generally not cleaned: these lines should be flushed regularly every six months for good maintenance. The WASH team found that the community water committees are aware of the cleaning practices for the structures but are not familiar with the procedures for distribution system flushing.

Water sources are very well protected against contamination. The same practice has been adopted for reservoirs and other structures.

5.3.2 System Reliability

Systems visited during the evaluation showed no signs of leaks except those in the service connections in Nieblí -- due to the low-quality fitting. All leaks detected are quickly repaired by the system operator, who seems to be well trained in routine repairs. The WASH team believes that the systems are built and operated to last for at least the design period.

Nevertheless, periodic regional technical assistance and supervision is needed and recommended. Such assistance should include a complete monitoring of the system, in-service training of the operator, and supervision of water committee activities. Refresher training courses also need to be implemented, possibly with CRS sponsorship and IEOS technical assistance. A "hands-on" type of course is advisable.

The evaluation team also looked at community organizational infrastructure and staffing. In general, communities have designated one or two members as caretakers or system operators who have been trained by IEOS and/or CRS. Also, water committees are named by a community general assembly; their members are trained by IEOS on Junta regulations, duties and responsibilities. The evaluation team found that the Juntas are keeping records, bank accounts, petty cash, etc., with no problems and with honesty.

5.4 Constraints

Difficult access to many elements of the system is considered by the evaluation team to be the major factor that could hamper the efficiency of the CRS/AID water and sanitation systems. Especially during the rainy season, access to the intakes and transmission lines is difficult and requires a long uphill climb. Landslides are likely to occur in that kind of terrain, causing logistic and labor problems.

Chapter 6

HUMAN RESOURCES DEVELOPMENT

6.1 Selection of Personnel

The project manager is a trained engineer, selected by CRS. (See Annex 5 for key individuals contacted.) During the early phase of the project, it was anticipated that the Ministry of Health (MOH) would provide assistance in the form of health education materials and personnel to organize and educate villages where water systems and latrines were being installed. When this assistance was not provided, CRS approached IEOS requesting the assistance of its promoters for the organization and education of villages. After considerable delay and essentially no assistance with promotion from IEOS, CRS approached SENAPS to carry out the health education. Sociedad Ecuatoriana Nacional de Asistencia y Promoción Social (SENAPS), an organization associated with the National Catholic Conference, was contracted by CRS for one year to have a health education promoter to organize and carry out health education activities. A number of SENAPS staff were assigned for a period of 6 to 7 months. After the 6-7 month period the SENAPS promoter assigned to health education resigned. Despite CRS's repeated inquiries, SENAPS did not assign another health education person for the remainder of the one-year contract.

6.2 Training

No training of personnel was funded by the CRS project. CRS-Ecuador proposed a conference with the five matching grant countries for the purpose of sharing information, but it did not take place.

Interchange and attendance at conferences sponsored by Ecuadorian institutions, USAID or other PVOs were taken advantage of judiciously by the CRS water project engineer.

The project engineer provided health and sanitation information to the SENAPS promoter in the form of informal in-service discussions. The promoter had promotion and training skills, but no health background or previous training.

Chapter 7

HEALTH, SANITATION, AND WATER USE EDUCATION

7.1 Community Health Education Approach

Community health education and promotion were provided by the Sociadad Ecuatoriana Nacional de Asistencia y Promoción Social (SENAPS) through its Department of Promotion, under a sub-contract agreement with CRS. During the contract time, SENAPS' Department of Promotion developed a health education approach based on seven talleres or training sessions for each community. A participatory, interactive approach was used by the SENAPS promoter.

A series of 13 pamphlets was developed and distributed to literate members of the communities. In addition to the pamphlets, large (poster-size) visual aids painted on cloth were developed and used during community sessions. The themes most commonly presented were the following: communications and dynamics, personal and environmental hygiene, organization for construction, payment of monthly quota and other projects for assistance to the community. A video cassette machine and camera were also used as a mechanism for involving members in the training sessions.

Only the pamphlets remain in the communities as reminders of the health education sessions. Most are carefully stored by community members. No visual aids were developed by the community members as reminders of health education and other lessons learned.

The Ecuadorian Institute of Sanitary Works (IEOS) has a Department of Promotion which works on a national basis providing health education courses and training materials, organizing the community Junta de Agua, promoting water tariffs and the installation of water meters among other related activities.

The SENAPS promoter collected health education materials from the IEOS Department of Promotion (responsible for health promotion and community development in water projects), the Ministry of Health and other institutions and distributed them in some of the communities. Unfortunately few of these collected materials were seen by the evaluators in visits to the communities.

The SENAPS promoter and a volunteer promoter met with community members to present information on organization for the legal and construction aspects, health education or hygiene, and latrine and water use. Demonstrations of various messages were carried out. In general, the villagers participated actively in the meetings.

7.2 Criteria Established/Curriculum

The evaluators did not find a curriculum. One should be developed to serve as a guide to the training and materials development. The criteria/curriculum should contain the following: description of trainees, objectives of training, content areas, training activities, materials to be used, and evaluation methods. This method of planning and developing the training approach apparently was not carried out.

7.3 Coordination with Construction and Maintenance

The promotion and health education sessions provided by the SENAPS promoters were closely coordinated with the construction activities. This is laudable given the distance traveled, the number of communities involved, and the adaptations made to the level of readiness and capability of the communities.

7.4 Materials and Methods Used - Household Water Use

Five types of training materials were developed: pamphlets (folletos), poster-size cloth "rotafolio" visual aids, beta cassettes, mimeographed information sheets, and posters from other institutions.

It does not appear that an informal survey or gathering of basic information was carried out to obtain a base of information for developing the training materials. If the materials were developed after promotion work (perhaps through focus groups) in several communities, this work could be "counted" as a base of information for materials development. It is not known if pre-testing of materials occurred.

7.4.1 Pamphlets (Folletos)

Thirteen pamphlets have been developed. They focus on the following areas: dynamics of communication, education on water and sanitation, personal hygiene, legal responsibilities, reports, latrine construction and use, rules and regulations, and evaluation.

It is not clear how they were used in the six training sessions. Promotion of construction and administrative regulations are much more frequently presented than health education information. Themes are often mixed, with an extraordinary amount of different information presented together. With the exception of one or two actual pamphlets, most "pamphlets" were simply mimeographed pages with considerable written information and only a few drawings. This unfortunately would limit their use in communities where literacy levels are low. It should be noted, however, that community members affirmed their usefulness in understanding their responsibilities (especially in the administrative/legal responsibilities sessions).

7.4.2 Poster-Size Cloth "Rotafolios"

One set of 10 posters was developed for use in community training. Coordination with the seven sessions was not clear. The majority (seven) were focused on health education themes and group dynamics. Apparently they were used to prompt group discussion. No additional sets were developed by the communities, so only one set of the work produced remains. The health education themes were reinforced by active demonstration by the SENAPS promoter. Community members were able to discuss some of the health themes which were projected on the posters.

It should be noted that, despite the active participation of women in the project, the visual images depicted male participants almost exclusively.

7.4.3 Beta Cassettes

Twenty cassettes were produced by SENAPS to record and replay training activities and to stimulate community members to participate in health education activities. A few of the cassettes were reviewed by the evaluation team. It is not clear why this fairly sophisticated audiovisual method was used -- except that a good deal of interest was expressed by villagers who were viewing themselves on film. After the resignation of the SENAPS promoter, CRS requested the return of the Betamax machine and cassettes, and this material was recently returned.

7.4.4 Information Sheets

A number of these sheets were produced. Many of the themes covered were organizational and administrative, with little or no health education/ promotion themes covered. These were given to the literate members of the community to help them organize the administrative and legal aspects of their projects.

7.4.5 Audiovisual Materials Developed by Children

In the village of Niebli, an alert, active teacher worked with the SENAPS promoter to train and stimulate children on themes related to water use and sanitation.

7.4.6 IEOS, MOH and Other Posters

A number of posters and educational materials were collected by the SENAPS promoter and distributed to the project communities. It is not clear if these materials were also used during the training sessions to reinforce the training messages.

7.5 Funding Allocation

The promotion/health education component was funded at U.S. $9,500. The funding came directly from the matching grant although it was presented/funded as a separate sub-project, as were special studies. It should be noted that costs per beneficiary for the 20 projects did not include health education/promotion costs.

As previously mentioned, no training of staff was funded from this component.

7.6 Constraints

The health education/promotion component was constrained by difficulty in identifying an institution interested and capable of developing and delivering training materials. After considerable discussion and delay, the MOH and IEOS were set aside as viable options, and discussions were begun with SENAPS.

Internal difficulties within SENAPS apparently hastened the departure (after only seven months) of the promoter assigned to the water project. Since his departure, another person has not been assigned.

An "external" constraint considered by the evaluators is the lack of health education/promotion materials related to water and sanitation available to the project. A modest library of books and newsletters in Spanish could have aided the development of a curriculum and health education and promotion materials. Similarly, a conference for interchange among matching grant personnel would have stimulated discussion and interchange of valuable experiences. In the same vein, technical assistance on health education training, materials development, and promotion techniques could have assisted the health education component. (See Annex 6 for additional information on health education.)

Chapter 8

ADMINISTRATION AND MANAGEMENT

8.1 Institutional Arrangements

CRS-Ecuador has established a sound institutional arrangement for the matching grant projects, following CRS's normal procedures. Estimated capital cost is allocated to the community water committee or Junta. The Junta has a president, a treasurer, a secretary, and three or four members. The president and treasurer have registered their signatures in a nearby bank agency where a Junta account is open. All the material and equipment which are going to be financed by CRS/AID matching grant funds are purchased by the Junta on the basis of three price quotations and upon the approval of the CRS-Quito office.

Skilled labor is hired through the same procedure. The Junta is responsible for keeping updated records of all expenditures and reporting to CRS on a monthly basis. CRS has established good working relationships with AID, IEOS, and the municipalities in the area, encouraging them to contribute to the financing of the water and sanitation systems.

CRS officials claim that, so far, there have been no significant problems with the Junta accounting or handling of the economic resources.

8.2 Coordination

The engineer/project manager coordinates all administrative and technical activities directly with community Juntas and also with national water agencies and other donors.

8.3 Current Funding Status

Table 1 in Annex 1 presents financial details for each of the 20 projects funded by the CRS/AID matching grant. CRS is currently preparing a revised funding status report which will update the differences encountered during the implementation phase.

8.4 Information Systems

For each project signed by CRS and the community, there is a simple but effective information system: on a monthly basis, the Junta has to report to CRS on the project's progress, financial status, and any other relevant activities.

8.5 Project Monitoring

The CRS Water Project Manager provides active on-site monitoring of the project financial and construction aspects. He works together with IEOS engineers and promoters, whenever possible, supervising the technical aspects of the project, the health education activities, and the training of system operators, giving administrative support to the Juntas, etc.

The Project Manager provides monitoring through on-site visits, meetings with community leaders and members, supervision and technical advice during the actual planning and construction phases. The manager also works with the communities to develop basic reporting and financial contract systems, teaching community members to keep the books themselves.

The monitoring of health education activities was delegated to the health educator. Monthly reporting consists of a brief narrative of activities and a summary of the number of health education activities carried out and number and kinds of materials developed.

8.6 Inventories

During the implementation of a scheme in the field, there are always some variations with respect to the original designs. These differences must be recorded so that, at the end, a good construction set of maps, graphs, etc., will be available for O&M and future reference.

CRS has hired the services of a specialist who will prepare the final inventories of all 20 CRS/AID matching grant projects at their conclusion.

Copies of such data will be given to each water Junta.

Chapter 9

PROJECT EFFECTS

During visits to some communities involved in the matching grant project, the WASH team identified several positive effects of the water project on the living conditions and habits of the people.

Social Effects:

- As a result of increased organization, communities have requested assistance, purchased supplies, planned and installed facilities, participated in training, initiated repairs, and kept records. In addition to the considerable organization shown during the water supply and sanitation project, they have used this approach to expand to other community projects and feel more empowered to direct their own activities.

- In several sites, most of the community members are improving their house construction using improved materials. Also, in some cases, they are beginning to construct special areas for their animals to separate them from family living quarters.

- Young couples who are currently living with their parents have started to build their own houses to have the right to a water connection with a meter. This reduces crowding and gives them better social status within the community.

- Women actively participated in meetings, construction and operation and maintenance. No special promotion appeared to be needed to encourage their participation.

Economic Effects:

- The skills learned in record-keeping, purchasing, and bank credit procedures have positively affected project members' confidence and ability to apply for bank loans and to purchase supplies in quantities for other activities.

- Although no base line data is available, it is assumed that reduced waterborne diseases would decrease health expenditures for doctor and clinic visits and medications for treatment of diarrheal diseases.

Health Effects:

- The short time that the project has been implemented does not allow the full effects of positive health benefits and the reduction of gastrointestinal diseases to be assessed. Further changes in health habits are needed to complement water and latrine construction.

- Subjective observations seem to indicate improvement of personal and household hygiene in some sites sparked by the project's vigorous health education effort and carried out by a dedicated teacher or other community leader.

- Broader health education efforts have been carried out with water and sanitation as an entry point.

Chapter 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 Project Development

10.1.1 Conclusions

1. CRS has demonstrated an exceptional capacity to mobilize resources to develop self-help programs which benefit poor rural communities achieving a high level of community organization.

10.1.2 Recommendations

1. CRS should continue to apply the same program approach which proved to be effective.

10.2 Community Selection and Participation

10.2.1 Conclusions

1. In general, criteria applied to select communities for the CRS/AID matching grant project are acceptable.

2. A high level of participation by the community -- both men and women -- is evidenced; however, the communities are more easily mobilized in the construction of water systems than for latrine programs.

3. Women were seen to actively participate in the community discussions and in the physical construction of water and latrine systems. They were also consulted regarding the location of yard taps.

10.2.2 Recommendations

1. For future programs, during the design phase, consideration should be given to the estimated O&M cost (especially for pumped systems) so this criterion could be taken into consideration during community selection.

2. The high level of community participation should be advertised to reinforce these activities.

3. CRS should continue to include women, as principal water users, in the decision making.

10.3 System Design and Construction

10.3.1 Conclusions

1. In general, design criteria are considered acceptable; source selection and protection are good. Sanitary facilities follow national standards.

2. Materials used for water and sanitation systems are acceptable. Both IEOS and CRS are supervising construction; methods used vary from one place to another with IEOS. CRS projects are more carefully supervised.

3. CRS/AID financial participation for each community project varies from 34 percent up to 67 percent. One project had additional support of 23 percent from other AID funds and one project received 24 percent funding support from a local municipality. Community participation in labor and cash varies from 24 percent to 33 percent.

10.3.2 Recommendations

1. CRS/AID should encourage IEOS to standardize house connections, designing a horizontal connection which is strong and long lasting.

2. In all cases where IEOS is the contractor for the construction of the system, CRS must check to see that the construction has followed the criteria and specifications stated by the CRS/IEOS contract agreement.

3. Efforts must continue to find other groups and agencies which would help with implementation of the program.

10.4 System Operations and Maintenance

10.4.1 Conclusions

1. All communities have received from CRS a set of good quality tools for maintaining the system. Also, caretakers have been trained in operation and maintenance practices. However, there are no pre-established maintenance schedules or written operations guides.

2. The operators have been trained in general O&M practices. However, a refresher course will be needed to keep them trained for routine operations and periodic maintenance practices.

3. Community members are aware of their responsibility to pay a monthly fee sufficient to cover at least the operations and maintenance costs.

10.4.2 Recommendations

1. Technical assistance from CRS and IEOS is recommended to help the communities in the preparation of routine operation programs and realistic maintenance schedules. Also, it is recommended that periodic, follow-up supervision be programmed for all 20 CRS/AID projects.

2. It is recommended that more substantive training courses be designed for all caretakers working in the 20 CRS/AID matching grant projects. A "hands-on" type of course would be most advantageous for this objective.

3. CRS must continue encouraging communities to pay for water services and to cover some expansion of the existing systems.

10.5 Human Resources Development

10.5.1 Conclusions

1. The project manager selected by CRS-Ecuador is a trained engineer. Health education personnel were requested by CRS from IEOS's Department of Health Promotion. When no personnel were appointed by IEOS, CRS contracted with SENAPS to appoint a health education person for one year.

2. No training of personnel was funded by this CRS project.

10.5.2 Recommendations

1. CRS must guide the process of personnel selection to assure quality engineering and health education and community development personnel.

2. Training should be funded and developed to upgrade project personnel knowledge and skills.

10.6 Health Education and Water Use Education

10.6.1 Conclusions

1. A dynamic religious brother from SENAPS (and a volunteer) worked aggressively to involve community members in a series of seven promotion meetings.

2. No evidence of a curriculum and guide to training was found during the evaluations to be able to assess the development and preparation of materials and programs.

10.6.2 Recommendations

1. CRS should provide more guidance to develop a health education approach which supplements the gains made in the project communities. A steady, patient planning process should complement the dynamic aggressive approach. Technical assistance should be sought.

2. CRS should implement a basic but adequate approach to curriculum development and preparation of training. Technical assistance should be considered to assist the health promotion personnel as needed. The content should balance water systems information with stronger environmental sanitation and personal hygiene education.

3. Health education and engineering personnel should continue to coordinate activities.

10.7 Administration and Management

10.7.1 Conclusions

1. CRS has established a sound institutional arrangement for the matching grant projects, following CRS's normal procedures. Funds equal to the estimated capital cost of the project are allocated to the community water committees or Juntas. All the material and equipment needed are purchased by the Junta on the basis of three price quotations and upon the approval of the CRS-Quito office. Skilled labor is hired through the same procedure.

2. The engineer/project director coordinates administrative and technical activities directly with community representatives.

3. Total cost of projects in Ecuador is estimated at $825,530 of which 62 percent is funded by CRS.

4. The community committees were trained to assume the responsibilities for monthly reporting of financial and construction activities. These reports were monitored by the project director.

10.7.2 Recommendations

1. The institutional arrangements established by CRS must continue close auditing of the Junta financial status and expenditures.

2. It is recommended that a single person be responsible for coordination of project activities to maintain a consistent approach and an institutional memory for CRS.

3. As soon as possible, CRS should prepare the fiscal total cost of each project and the estimated per capita costs.

10.8 Project Effects

10.8.1 Conclusions

1. Community organization has been strengthened as a result of participation in this project. Women as well as men have participated in decision-making, construction, and record-keeping. Community involvement in broader community development activities has resulted.

2. Increased record-keeping and purchasing skills were learned during the project. This then allowed community members to apply successfully for agricultural credit.

3. Communities anecdotally report a decrease in gastrointestinal disease incidence. Further health effects are expected as health education positively affects personal and household hygiene habits. Water supply and sanitation health education has been an entry point for broader community health interventions.

4. As a result of the introduction of water meters on all water services, young couples who used to live with their parents are now building their own houses in order to have rights to a water connection.

5. Spurred on by the activities of the water projects, community people are improving their houses and using improved materials.

10.8.2 Recommendations

1. CRS should recognize and continue to support and build on the skills and changes which the communities have initiated as an indirect result of the water project.

2. Community people should be encouraged to improve their homes and up-grade the water and sanitation services.

3. Further health education efforts need to be addressed as a priority by CRS. Behavior changes which have lagged behind the installation of water taps and latrines need to be addressed with a renewed health education effort.

ANNEX 1

Selected Project Information for Ecuador

Table 1 - Ecuador Projects under USAID/CRS Program

Table 2 - Geographical Distribution of CRS/AID Funded Projects

Table 3 - Status and Construction Details of CRS/AID Projects

Table 4 - Design/Technical Aspects of CRS/AID Matching Grant Projects

Table 1

ECUADOR PROJECTS
UNDER USAID/CRS PROGRAM

(in U.S. Dollars)

	Name	Type	Total Cost	CRS Cost	PCTG.	Benef. Pres.	Benef. Design	T. Cost/ Capita	T. Cost/ Capita Design
1.	Agualongo	GHP	$ 51,345.52	$ 33,452.00	65.15%	700	1,050	$ 73.35	$ 48.90
2.	Guantalo	GH	25,315.60	16,488.40	65.13%	380	570	66.62	44.41
3.	Simón Bolivar	GH	23,560.00	8,057.17	34.20%	322	483	73.17	48.78
4.	Calvario	GH	49,175.00	25,696.00	52.25%	450	675	109.28	72.85
5.	Pichul	EPGH	80,675.00	41,713.00	51.70%	800	1,200	100.84	67.23
6.	Chaupicruz	GH	14,449.65	11,441.00	78.18%	75	113	192.66	128.44
7.	Putugleo	GH	162,400.00	79,808.00	49.14%	1,971	2,957	82.39	54.93
8.	San Francisco	GH	42,259.00	35,635.00	84.33%	524	786	80.65	53.76
9.	Nieblí	GH	24,511.00	13,675.00	55.79%	260	390	94.27	62.85
10.	Yanajaca	GH	20,350.00	16,664.00	81.89%	300	450	67.83	45.22
11.	Pambamarquitos	GP	15,200.00	12,131.00	79.81%	312	468	48.72	32.48
12.	Palo Quemado	GH	35,789.00	25,869.00	72.28%	380	570	94.18	62.79
13.	Las Pampas	GH	39,602.00	33,078.00	83.53%	445	668	88.99	59.33
14.	Puembo	GH	35,686.00	28,032.00	78.55%	370	555	96.45	64.30
15.	El Rosal	GH	29,968.00	23,870.00	79.65%	530	795	56.54	37.70
16.	La Merced	GH	33,828.00	25,123.00	74.27%	392	588	86.30	57.53
17.	Ocshaloma	GH	12,936.00	9,180.00	70.96%	244	366	53.02	35.34
18.	San Miguel Prado	GH	17,024.00	13,251.00	77.84%	290	435	58.70	39.14
19.	San Miguel Pillaro	GH	87,086.00	36,848.00	42.31%	2,500	3,750	34.83	23.22
20.	Guagala	GP	6,760.00	5,669.00	83.86%	200	300	33.80	22.53
	Sub Totals		**$807,919.77**	**$495,680.57**	**61.35%**	**11,445**	**17,168**	**$ 70.59**	**$ 47.06**
	Feasibility Studies		$ 2,038.24	$ 2,038.24	100.00%				
	Health Training		$ 9,564.00	$ 9,564.00	100.00%				
	Technical Studies		$ 6,005.81	$ 6,005.81	100.00%				
	GRAND TOTAL		**$825,527.82**	**$513,288.62**	**62.18%**				
	Averages		$ 40,395.99	$ 24,784.03	68.09%	572	858	$ 79.63	$ 53.09

Notes: The GRAND TOTALS do not include supplemental project support funds from other sources, estimated at about $30,000.
E = Electric Pump
G = Gravity System
H = Household Connection
P = Public Standposts

~~TABLE 2~~

GEOGRAPHICAL DISTRIBUTION OF CRS/AID FUNDED PROJECTS

NUMERO	NOMBRE	PROVINCIA	CANTON	PARROQUIA	DISTANCIA [redacted]
EC 4D 002	Agualongo de Paredes	Imbabura	Antonio Ante		al filo de la carretera Quito-Imbarra
EC 4D 003-1	Palo quemado/Sta Rosa/Las Pampas				
EC 4D 010	Guantualó	Cotopaxi	Pujilí	Isinliví	a 125 km Latacunga
EC 5D 003	Simón Bolívar	Pichincha	Pedro Moncayo	Tabacundo	a 11 km de Cayambe SECS
EC 5D 005	El Calvario	Tungurahua	Mocha	Tisaleo	a 20 km de Ambato (3er orden carretera)
EC 5D 006	San José Pichul-Santa Rosa Pichul, Los Hornos y Tañalo	Cotopaxi	Latacunga	Latacunga	a 3 km de Latacunga
EC 5D 007	Chaupicruz	Cotopaxi	Pujilí	La Maná	a 80 km de Latacunga
EC 5D 009	Putugleo	Tungurahua	Ambato	Quisapincha	de Ambato 7 km asfaltado y 11 km mal carretero 4ta clase
EC 5D 010	San Francisco	Cotopaxi	Pujilí		a 10 km de Pujilí (y 2 km de mal camino)
EC 5D 011	Nieblí	Pichincha	Quito	Calacalí	a 34 km de Quito CRS
EC 5D 012	Yanajaca	Imababura	Pimampiro	Mariano Acosta	a 15 km de Pimampiro (carretero 3er orden)
EC 5D 013	Pambamarquitos	Pichincha	Cayambe	Otón SECS	
EC 5D 014	Paloquemado	Cotopaxi	Latacunga	Las Pampas	
EC 5D 015	Las Pampas	Cotopaxi	Latacunga	Las Pampas	
EC 5D 016	Puembo	Cotopaxi	Pujilí	La Maná	a 120 km Latacunga y 5 km de La Maná (carretero lastrado)
EC 6D 003	El Rosal	Tungurahua	Ambato	Mocha	Otón + 7 km
EC 6D 004	La Merced	Cotopaxi	Pujilí	Pujilí	10 km de Pujilí
EC 6D 005	Ocshaloma	Cotopaxi	Pujilí	Poaló	de Pujilí 17 km vía asfaltada y 4 km mal carretero
EC 6D 006	San Miguel del Prado (Ferrocemento)	Pichincha	Cayambe	Ayora	a Cayambe 15 km SECS
EC 6D 007	San Miguelito de Píllaro	Tungurahua	Píllaro	Píllaro	Ambato + 10 km
EC 6D 008	Guagalá	Imababura	Pimampiro	Chugá	a Pimampiro 30 km

			(m.)	(mm.)	(l/s)	(m.)	(mm)	(l/s)	
C 4D 002	Agualongo de Paredes	60%	2.300	75	1,05	5.533	75,50,38,25	2,1	110
C 4D 010	Guantualó	100%	3.320	38	0,75	1.866	12,18,25,38, 50	~~1,50~~	63
C 5D 003	Simón Bolívar	100%	500	50	0,61	6.750	12,25 y 60	1,22	73
C 5D 005	El Calvario	95%	3.126	25,32 y 38	1,56	5.430	19,25,38 y 50	2,06	112
C 5D 006	San José Pichul, Santa Rosa de Pichul, Los Hornos y Tañaló.	95%	2.508	75	2,03	10.758	19,25,38,50 y 75	4,06	140
C 5D 007	Chaupicruz	100%	990	38,50 y 75	2,09	1.713	25	0,13	20
C 5D 009	Putugleo	85%	7.000	38,50,75,100	4,38	10 000	12,19,25,32	8,76	450
C 5D 010	San Francisco	100%	900	12,18,25,32,50, 63	1,04	5.180	12,19,25,38,50	3,12	127
C 5D 011	Niebli	100%	124	19 y 25	0,36	509	25,38,50	0,52	38
C 5D 012	Yanajaca	90%	1.649,60	18,25 y 38	0,54	3.001	38,25,18 y 12	1,08	54
C 5D 013	Parbamarquitos	70%	850	38,25	0,4	3.720	12,19,25,38	0,53	10 grifos comunales
C 5D 014	Paloquemado	70%	5.393	38,50,75	1,17	4.179	12,19,25,31,38,50	1,79	80
C 5D 015	Las Pampas	65%	3.457,60	38,50,75	1,5	1.467	~~19,25,38,50,75~~ 25,32,50,63	2,00	100
C 5D 016	Puembo	90%	350	25,32 y 50	0,84	4 900,60	90	1,94	77
C 5D 003	El Rosal	10%	40	50	1,02	6.553	50,38,32,25,19	2,041	106
C 6D 004	La Merced	10%	3.945	25,32,50	1,00	5.460	25,32,50 y 90	1,95	70
C 6D 005	Oshaloma	10%	272	25	0,32	2.547	25,18	0,63	43 y 6 grifos comunales
C 6D 006	San Miguel del Prado	10%	846	25	0,37	7.668	38,25,18,12	0,75	61
C 6D 001	San Miguelito de Píllaro	10%	8.950	50,75,100	5,55	5.114	25,32,50,75	11,10	402
C 6D 003	Guagalá	10%	1.134	12,19,25	0,44	541	18,25,38	0,73	8 grifos comunales

TABLE 4

DESIGN/TECHNICAL ASPECTS OF CRS/AID MATCHING GRANT PROJECTS

NUMERO	NOMBRE	TIPO DE SISTEMA	FUENTE	TIPO DE CONDUCCION	TANQUE DE TANQUE DE RESERVA	SISTEMA DE TRATAMIENTO	CAUDAL	DISTRIBUCION DIAMETRO	DISTRIBUCION CAUDAL	CONEXIONES DOMI
EC 4D 002	Agualongo de Paredes	"	subterranea	"	15 20 m3	cloración	7.272	75,50,38,25 mm	2.1 L/s	110
EC 4D 010	Guantualó	"	"	"	20 m3	cloración	1.866	12,18,25,38,50	1.20 l/s	63
EC 5D 003	Simón Bolívar	"	"	"	20 m3	cloración	6.750	12,25 y 60 mm	1.22 l/s	73
EC 5D 005	El Calvario	"	"	"	35 m3	cloración	5 430	19,25,38,50 mm	2.08 l/s	112
EC 5D 006	San José de Pichul, Santa Rosa de Pichul Los, Hornos, Tañalo	bombeo	"	bombeo	50 m3	cloración	10.758	18,25,38,50,75	4 06 l/s	140
EC 5D 007	Chaupicruz	gravedad	"	gravedad	10 m3	cloración	1 713	25 mm	0.13 l/s	20
EC 5D 009	Putugleo	gravedad	subterranea	gravedad	50 30 y 15 m3	cloración	10.000	12,19,25,32	8.76 l/s	450
EC 5D 010	San Francisco	"	"	"	30 m3	cloración	5.180	12,19,25,38,50 mm	3 12 l/s	127
EC 5D 011	Nieblí	"	"	"	15 m3	cloración	509	25,38,50 mm	0 52 l/s	38
EC 5D 012	Yanajaca	"	"	"	10 m3	cloración	3.001 m	12,18,25,38 mm	1 08 l/s	54
EC 5D 013	Pambamarquitos	"	"	"	15 m3	cloración	3 270 m	12,18,25,38 mm	0.53	10 grifo co
EC 5D 014	Paloquemado	"	"	"		desarenación filtración lenta	4.179 m	12,18,25,31,38 50 mm	1,79	80
EC 5D 015	Las Pampas *	"	superficial	"	30 m3	cloración filtro lento	1.476 m	18,25,38,50,75 mm	2 00	100
EC 5D 016	Puembo	"	"	"	10 y 10 m3	filtro lento y desinfección	4.900,60	25,32,50,63,90 mm	1.94 l/s	77
EC 6D 003	El Rosal	"	"	"	20 m3	aereción filtración desinfección	6.553	50,38,32,25,19 mm	2 041 l/s	106
EC 6D 004	La Merced	"	subterranea	"	20 m3	cloración	5.460	25,32,50,90 mm	1.95 l/s	70
EC 6D 005	Ocshaloma	"	"	"	20 m3	aereación y cloración	2.547	25 y 18	0,163	43 y 6 grifo
EC 6D 006	San Miguel del Prado	"	"	"	15 m3	cloración	7.668	38 25.18 12	0 75 l/s	61
EC 6D 007	San Miguelito de Pillaro	"	"	"	40,50,20 m3	cloración	5.114	25,32,50,75	11 10	402 grifo co
EC 6D 008	Guagalá	"	superficial	"	10 m3	cloración	541	18,25,38 mm	0 73 l/s	8

Source: CRS/Ecuador

ANNEX 2

CRS Criteria
for Community Selection
(In Spanish)

CRITERIOS BASICOS PARA EVALUACION DE PROPUESTAS DE PROYECTOS DE DESARROLLO

CRS/ECUADOR

1. Proyectos que presenten grupos y/o comunidades marginales y que respondan a necesidades identificadas, sentidas y expresadas por ellos mismos.

2. Proyectos que tiendan a reducir y/o a eliminar las causas fundamentales de la pobreza o los diferentes problemas u obstáculos al desarrollo de grupos y/o comunidades.

3. Proyectos que beneficien a grupos y/o comunidades pobres que efectivamente no tienen acceso a otra clase de apoyos y que mediante la ejecución de los mismos pueden mejorar su situación socio-económica.

4. Proyectos que contengan un alto nivel de participación de los beneficiarios en el análisis de su realidad, elaboración, ejecución y evaluación de planes y actividades que adicionalmente participen con aportes humanos, financieros y materiales.

5. Proyectos que fomenten y/o refuercen las organizaciones de base para la solución adecuada y definitiva de sus problemas.

6. Proyectos que causen un efecto multiplicador como ejemplo en el área de influencia.

7. Proyectos que posibiliten el empleo de la asistencia técnica adecuada por parte del sector público o privado.

8. Proyectos que tiendan a optimizar el uso de recursos locales y externos para lograr la mayor eficiencia en la ejecución.

9. Proyectos que tengan un mínimo sistema de evaluación periódica y final.

10. Proyectos que propicien su continuidad en el futuro en base de su organización, el autofinanciamiento y la autogestión.

11. Proyectos que tiendan a mejorar las capacidades humanas y el nivel socio-económico y técnico de los beneficiarios.

12. En proyectos que contemplen la promoción, capacitación, y organización popular a través de una agencia o entidad (intermediaria), el plan debe contemplar un esquema de transferencia sistemática del programa a la organización popular y un término definitivo de la intervención de la agencia o entidad.

WM/Mm.

Fuente: Archivo de Catholic Relief Services

CATHOLIC RELIEF SERVICES-USCC
CRS/ECUADOR
Apartado Nª 226-A-Quito
Teléfono 230-298

GUIA PARA ELABORACION DE PROYECTOS

1.0. IDENTIFICACION DEL PROYECTO

1.1. Localización del proyecto

1.1.1. País:

1.1.2. Provincia:

1.1.3. Cantón:

1.1.4. Parroquia:

1.1.5. Sitio/lugar:

1.2. Título del Proyecto:

1.3. Aplicante del proyecto (institución, organización, grupo)

1.3.1. Nombre:

1.3.2. Dirección:

1.4. Organización y Personal legalmente responsable de la implementación y administración del proyecto.

1.4.1. Organización: (Nombre y Dirección)

1.4.2. Persona: (Nombre y Dirección)

2.0. HISTORIA DEL PROYECTO

2.1. Detallar claramente la situación actual de la zona y comunidad en la que se va a desarrollar el proyecto (Ver anexo).

2.2. Explique la (o las) necesidad (es) que afectan actualmente a la comunidad o grupo y que pretende solucionar con este proyecto.

2.3. Indique los recursos disponibles que el grupo o comunidad está dispuesto a entregar para este proyecto.

2.3.1. Financieros: (aporte en dinero, cuánto en total? cuánto por familia? cómo se recaudará estos fondos?

2.3.2. Humanos: (mano de obra; número de personas por semana, por día, por mes, cuánto gana un hombre por día de trabajo en la zona?)

2.3.3. Materiales/Insumos en especie: (piedra, arena, madera, terrenos, alimentos, otros).

2.3.4. Técnicos: (quién lo dirigirá técnicamente? quién mantendrá el proyecto?)

2.3.5. Administrativos: (quién administrará el dinero, los materiales, las personas? quién llevará la contabilidad y con qué sistema).

2.3.6. Otros recursos: (especifique)

3.0. ALTERNATIVAS DE ACCION

(En base a las necesidades encontradas y a los recursos disponibles)

3.1. Indique si este proyecto es parte integrante de otro más grande o es el único que se está ejecutando en la zona.

3.2. Indique el número total de personas que se beneficiarán de este proyecto.

3.3. Indique cómo está organizada la comunidad y/o el grupo.

3.3.1. En forma general

3.3.2. Para ejecutar este proyecto (distribución de responsabilidades y funciones).

3.4. Etapas o Fases del Proyecto

(Ponga en orden las acciones que se realizarán y el tiempo necesario para ejecutar de la mejor manera el proyecto de acuerdo al estudio técnico).

3.4.1. Primera Etapa

3.4.2. Segunda Etapa

3.4.3. Tercera Etapa

3.4.4. Etc. Etapas necesarias

3.5. Plan de Evaluación

Indique detalladamente quién, cómo y en qué plazos se llevará a cabo las siguientes acciones:

3.5.1. Supervisión y/o control

3.5.2. Información de la marcha del proyecto

3.5.3. Evaluación (periódica y final)

4.0. FINANCIAMIENTO DEL PROYECTO

4.1. Costo total del proyecto

4.1.1. SUCRES S/ 4.1.2. US$ DOLARES

4.2. Indique cualquier factor que puede hacer variar los costos del proyecto y señale un tanto por ciento (%). (Inflación, variación de la moneda, etc).

4.3. Cantidad solicitada a CRS

4.3.1. En donación S/.

4.3.2. En crédito S/.

(Indique forma en que cancelará, plazos, tiempo de gracia)

4.4. Indique cómo desearía recibir el dinero

FECHAS	CONCEPTO	CANTIDAD (en sucres)
Ej: 20/mayo/1982	Compra de ganado	220.000,oo

4.5. Indique si el proyecto tiene y/o tendrá otras fuentes de ayuda.

FUENTE	CONCEPTO	CANTIDAD (en sucres)
Ej: Consejo Provincial	Ladrillos	60.000,oo

5.0. INVERSION GENERAL DEL PROYECTO

5.1. Indique en detalle las inversiones totales que se realizarán para llevar a cabo el proyecto.

CONCEPTO	CANTIDAD	VALOR UNITARIO	COSTO TOTAL
Ej: Ladrillos	1.000	S/ 2.40	S/2.400,oo

****

ANEXO DE LA GUIA PARA ELABORACION DE PROYECTOS

1. Nombre y ubicación de la localidad. Datos históricos.

2. Población: Número total, por sexos, por edad, promedio por familia, idioma, composición étnica (raza), densidad por Km^2.

3. Aspectos físicos: Superficie (Km^2); topografía, tipo de tenencia de la tierra, (posesión de la tierra y uso); tipo de suelos; recursos forestales, recursos minerales; agua, clima (Temperatura, precipitación anual, épocas de lluvia y de sequía; carreteras; transporte; telecomunicaciones; electricidad; riego (canales, acequias).

4. Aspectos económicos: Ingresos familiares (medios de subsistencia-fuentes de ingreso, de dónde provienen los ingresos familiares); promedio mensual de ingreso por familia, gastos principales promedio mensual; ocupaciones principales de la población; desocupación, opottunidades de ahorro y crédito; producción de la zona y comunidad: agricultura, ganadería, industria, artesanía, pequeña industria, industria casera, cría de animales menores, etc.

5. Aspectos Sociales: Educación: Población escolar, sistema educativo, locales escolares, educación especial, analfabetismo; Alimentación: dieta diaria, alimentos principales, otros alimentos necesarios; Salud y Salubridad: enfermedades principales; malnutrición, servicios médicos y medicinas (botiquines, puestos de salud, centros de salud, hospitales, clínicas), letrinización, canalización, agua potable; vivienda: tipo de vivienda general, necesidad de vivienda, tenencia de la vivienda.

FUENTE: Catholic Relieve Services (CRS)

CONVENIO

MATCHING GRANT

REF: EC

Catholic Relief Services-USCC/Programa en Ecuador (CRS), representada por su Director el Señor John Conroy y la comunidad de representada por el Presidente de la Junta de Agua Potable de Sr. , acuerdan en celebrar este convenio para la implementación del Sistema de Agua Potable y Saneamiento Ambiental de la comunidad de de acuerdo a las siguientes cláusulas:

PRIMERA:

Catholic Relief Services USCC/Programa en Ecuador (CRS), entregará a la comunidad de la suma de provenientes de Matching Grant Contract Nº , firmado entre Catholic Relief Services y la Agencia Internacional para el Desarrollo Washington, AID, en Septiembre 20, 1983, suma que servirá para la construcción del Sistema de Agua Potable y Saneamiento de la mencionada comunidad y cubrirá los siguientes rubros:

	Obra Civil	Accesorios	Asistencia Técnica	TOTAL
Captación				
Conducción				
Rompepresión conducción				
Reserva				
Clorinación				
Distribución				
Válvula desague Dist.				
Rompepresiones Dist.				
Letrinas				
Llaves Públicas				
TOTAL				

SEGUNDA:

La comunidad de se compromete a las siguientes subcláusulas:

a) Dar toda la mano de obra que fuere necesaria para la implementación de la obra que está valorada en distribuídos de la siguiente manera:

RUBRO	CANTIDAD
Captación	
Conducción	
Rompepresión Conducción	
Reserva	
Distribución	
Válvula Desague Red	
Rompepresiones Red	
Letrinas	
Llaves Públicas.	

S/

b) Dar una contribución económica de acuerdo a lo estipulado en el proyecto es to es: los mismos que serán utilizados para la implementación de letrinas.

c) Formar una Junta de Agua Potable, la misma que se hará cargo de la buena marcha del sistema de agua potable luego de su culminación, así como también supervigilará la construcción misma.

d) Adoptar una cuota mensual la misma que servirá para mantenimiento, operación y fondo de emergencia del sistema de agua potable, conforme lo establezca la Junta de Agua Potable.

e) IMPLEMENTAR EL SISTEMA DE AGUA POTABLE, EN EL PERIODO ESTABLECIDO EN EL CRONOGRAMA DE AVANCE DE OBRA ADJUNTO, UTILIZANDO LOS FONDOS DE ACUERDO CON LO ESTIPULADO EN LA CLAUSULA PRIMERA Y EN EL PROYECTO. DEPOSITAR Y MOVILIZAR LOS FONDOS OBJETO DE ESTE CONVENIO DESDE CUENTAS BANCARIAS EXCLUSIVAS, MANTENIENDO SUS REGISTROS CONTABLES Y FACTURAS, CONTRATOS, RECIBOS, etc., los que serán conservados por un período de cinco años.

f) Enviar a CRS/Ecuador, un informe narrativo y financiero del avance de obra realizado cada mes.

En caso de demora, se deberá justificar a CRS/Ecuador, con la debida anticipación a efecto de lograr una extensión en el tiempo de ejecución de la obra.

g) CUMPLIR CON LAS INSTRUCCIONES EMITIDAS POR CRS/ECUADOR EN LO REFERENTE A LA ADQUISICION DE MATERIALES, EQUIPOS, HERRAMIENTAS, Y/O PAGO DE PROFESIONALES Y FIRMAS COMERCIALES, DE ACUERDO AL ANEXO Nº 1 EL MISMO QUE FORMA PARTE INTEGRAL DE ESTE CONVENIO.

h) Solicitar a CRS/Ecuador, autorización antes de efectuar cambios o gastos no previstos.

i) En el improbable caso de que se comprobara la malversación de fondos por medio de una auditoría repagar a CRS/Ecuador los fondos usados irregularmente. También cualquier sobrante de fondos del proyecto a la fecha de culminación del mismo, deberá ser inmediatamente reembolsado a CRS/Ecuador.

TERCERA:

CRS/Ecuador a través de sus funcionarios o representantes del donante y en compañía de funcionarios de CRS/Ecuador, se reservan el derecho de visitar el proyecto e inspeccionar los registros correspondientes sin previo aviso y cuando a bien lo tuvieren.

CUARTA:

CRS/Ecuador, no asume responsabilidad laboral, o aquellas causadas por pérdidas, daños o cualquier otro asunto que pudiera ocasionarse en la implementación del proyecto.

Para constancia y fiel cumplimiento de lo convenido, las partes firman el presente documento en original y tres copias en la ciudad de Quito a los

John Conroy
ACTING DIRECTOR ECUADOR PROGRAM
CATHOLIC RELIEF SERVICES

ANNEX `

Photographs

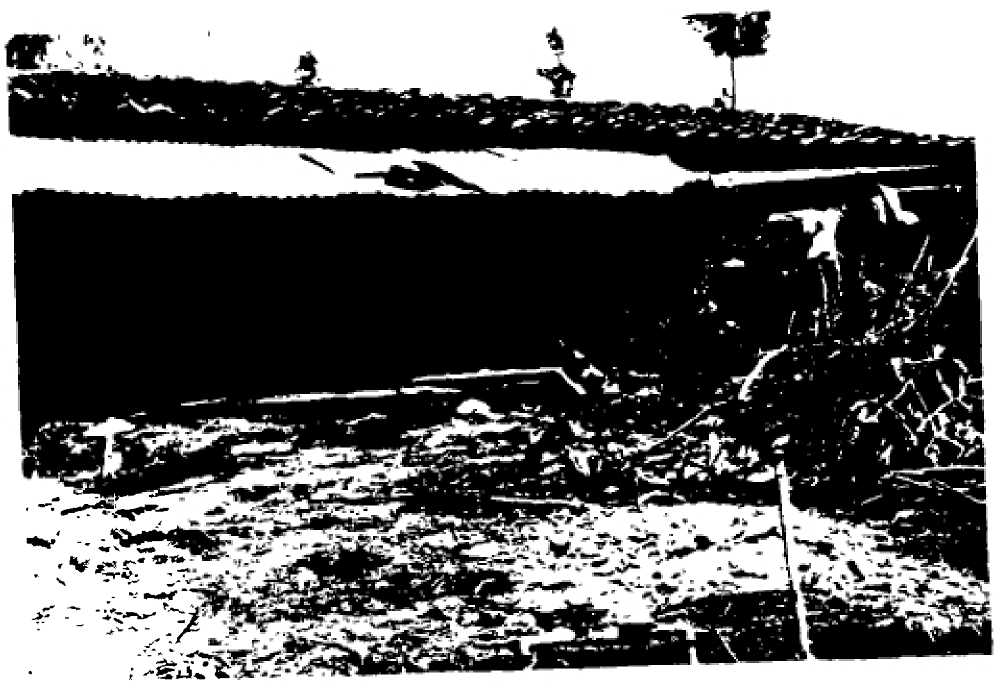
Photo 1. Women from rural community working on trenches for water pipe.

Photo 2. Women opening trenches for pipe installation.

Photo 3. PVC pipe installation by community.

Photo 4. Typical landscape with trench filled & ready for service.

Photos 5 and 6. Typical house connection with meters.



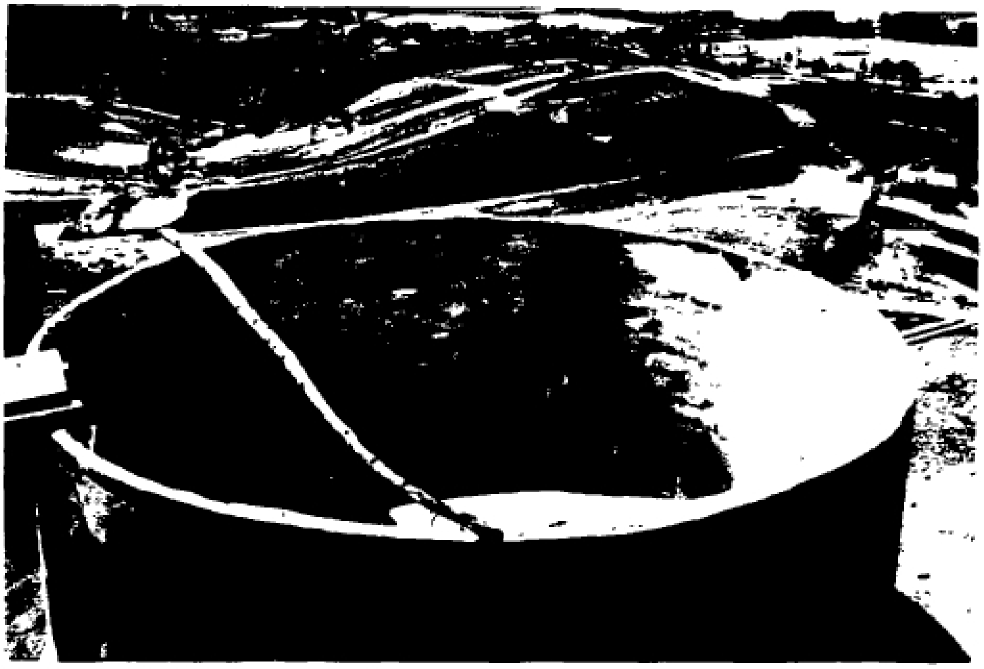


Photo 7. Experimental ferrocement water storage tank.

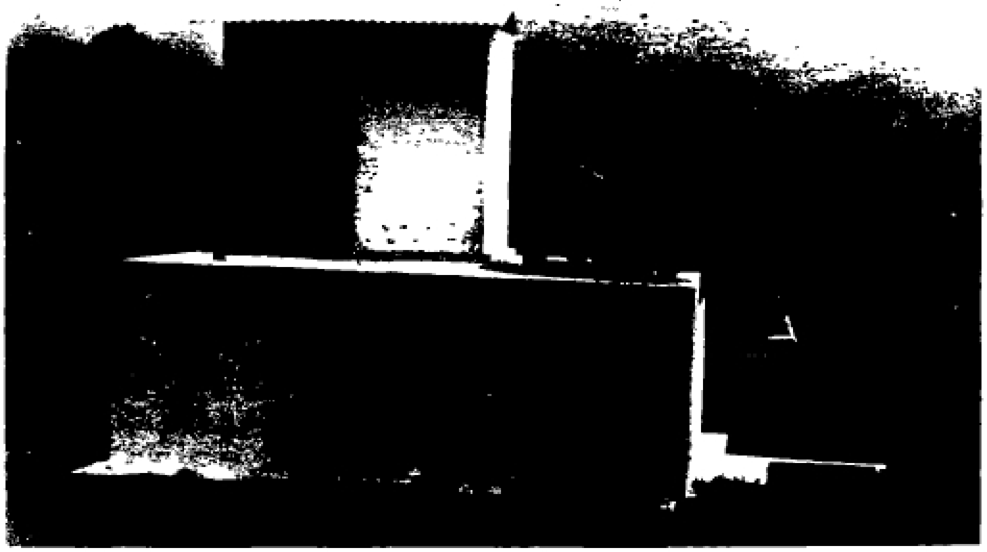


Photo 8. Water storage tank built by CRS. Chlorination house mounted on top of tank.

Photo 9. Typical terrain at a spring water source.

Photos 10 and 11. Water sealed latrines using toilet fixtures.

ANNEX 4

Selected Field Observations on
Materials and Methods of Construction

SELECTED FIELD OBSERVATIONS ON
MATERIALS AND METHODS OF CONSTRUCTION

Materials used for water and sanitation systems are acceptable. Most of the PVC pipes used in the project came from local industry. In one community WASH found that some PVC accessories such as tees were broken because of the hard service. Apparently, the quality of such material was not appropriate for the local conditions. The local operator and his wife are doing the necessary repairs to keep the system running.

System construction assisted and supervised by CRS is superior in comparison to that built by IEOS. Some details need improvement like the house connections with a vertical extension, the water storage tank ventilation pipe without screens, the use of sodium hypochlorite instead of powdered calcium hypochlorite, etc., which were found during the WASH visits to some community systems. This was the case at San Francisco in Cotopaxi Province where WASH detected the following typical problems:

- Service line has been installed using vertical connection of about 80 cm. -- instead of a horizontal connection.
- Water reservoir inlet valve pit has no cover.
- Water reservoir ventilation pipe is without screen.
- Sodium hypochlorite, unknown concentration, has been provided for disinfection instead of the specified HTH-60% strength, at a rate of $175 per 5 gallons.
- Water distribution tank and reservoir are not functioning correctly because hydraulic regulation is needed.
- Valve pits are allowed to fill with water, which can cause premature rusting of pipes and fittings.
- Two pressure regulation tanks have no float valve installed; the valves are stored in a warehouse.
- In one case, a distribution line crosses an irrigation channel without any protection and is subject to damage.
- All service connections were installed without unions at the valves or meters to allow removal without cutting the pipe. All unions provided by CRS were left in the warehouse.
- All water meters are unprotected -- mounted on the service connection in the open air.

ANNEX 5

Key Individuals Contacted

KEY INDIVIDUALS CONTACTED

Ms. Carol Monroe	Director, CRS Mission to Ecuador
Mr. Herbert Caudill	Project Engineer, USAID Mission to Ecuador
Mr. Juan Vásconez	Project Manager, CRS
Mr. Eduardo Coral	IEOS, Health Education Department

ANNEX 6

Selected Field Observations on Health, Sanitation, and Water Use Education

SELECTED FIELD OBSERVATIONS ON HEALTH, SANITATION, AND WATER USE EDUCATION

SENAPS played an active part in the stimulation and education of community members in health, sanitation, and water use. A series of six sessions was carried out with information exchange methods including lecture, demonstration, return demonstration, and active participation of "trainees". Reinforcement included practice sessions, distribution of training materials, and use of visual aids including "rotafolios" and betamax filming.

This approach was apparently well received by villagers and they were able to recall various training exercises and health messages.

Unfortunately, there has not been a person or group selected, as part of the water and sanitation committee (or other mechanism), to continue to work on stimulating the community on health education issues. Very few visual aids remain to remind the community of the health education messages. Had more time been allocated, the community/participants could have been involved in the development of their own visual aids.

The amount of work done by the SENAPS promoter and volunteer was enormous. However, much more needs to be done, especially in the area of environmental and personal hygiene. It often is a long-term effort.

It is difficult to evaluate the benefits of the use of the Betamax in the villages. It certainly seemed to stimulate the villagers. Given the cost, however, perhaps the investment could have been made in educational materials which would have remained in the villages as reminders of health messages.

CRS should consider mounting another health promotion effort, using funds remaining from the matching grant with funds from other sources. Reinforcement of the health training already given is appropriate. Development and distribution of additional health education materials in the communities to reinforce health education messages is also recommended.

The active participation of the entire community should continue to be stimulated. In addition, a small group of interested persons could be chosen to work closely with the CRS health education promoter so that additional capability is developed and remains with community members. This group could be closely associated or serve as members of the Junta de Agua and address health education issues during Junta and community meetings.

The base of health education information/skills developed during the matching grant program can also be used to develop broader health programs in the communities.

Given the time limitations, a great deal of valuable training took place, and materials were developed to fortify this training.

In the future, a more disciplined approach to the development of a curriculum should include: the description of those to be trained; objectives for the training courses; details of the content areas; definitions of the changes in behavior expected as a result of the training; activities to be carried out during training; materials to reinforce training messages and evaluations. The investment in planning the training would hopefully reap even larger health education benefits for the communities.

The promotion and health education was closely coordinated with the construction in both timing and content of the information presented. For the most part, it was also coordinated with maintenance. The short duration (6-7 months) of the SENAPS promotion work makes it necessary to examine the need for further promotion and health education in the projects still being developed and for follow-up education in the earlier projects as needed.

Five types of health education and promotion materials were developed. The information base was developed rather informally and materials were not pretested before widespread distribution. To ensure the appropriateness of materials to the audience and their understanding by the group, a more disciplined approach to materials development should be used.

If materials are not developed specifically for a given audience, understanding of materials can (and, to some extent in this project, this was the case) be increased by verbal explanation.

Whether new or adapted materials are chosen, they should supplement training and remain in the communities to reinforce health messages.

Pretesting and revision are valuable steps in the development of materials which are clearly understood by the target audience. (See WASH Technical Report No. 24, Pretesting and Revising Visual Materials for Water Supply and Sanitation Programs.)

Promotion materials from other institutions can be sought out and adapted for use within the CRS project. The community members can also be involved in making their own visual aids which would portray their understanding of messages. School children can also produce health education materials.

Although health education is a vital component of the CRS project, the identification and contracting of a responsible and competent agent to carry out these activities was a lengthy and difficult process. The identification of health education promotion materials as resources and the upgrading of the promotion in technical health information required a considerable CRS investment of time and effort.

APPENDIX B

FIELD REPORT ON EVALUATION OF CRS PROJECTS IN PERU

by

Oscar R. Larrea
and
Rose M. Schneider

APPENDIX B

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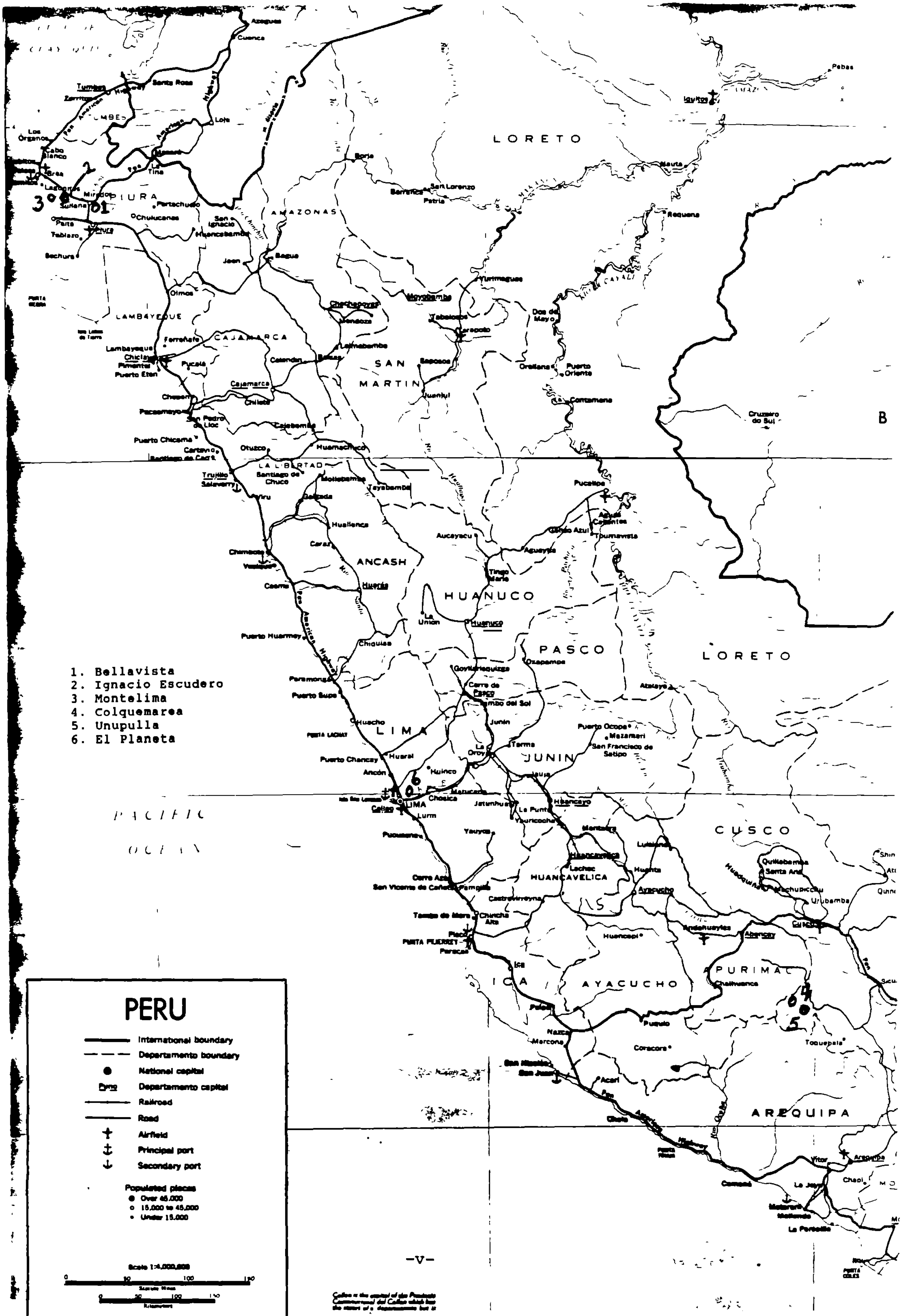

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MAP OF PERU

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LIST OF ACRONYMS

CESEPAC	Centro de Servicios de Pedagogia Audio-Visual para la Capacitación (Center for Audiovisual Instruction for Training)
CORPIURA	Corporación para el Desarrollo de Piura (Development Corporation of Piura)
IDECO-VICUS	Instituto de Desarrollo Comunal (Community Development Institute)
IAC	Instituto Animación Campesina (Institute for Rural Promotion)
lpcd	Liters per capita per day
MOH	Ministry of Health
PVO	Private Voluntary Organization
SEDA-PIURA	Servicio de agua potable - Piura (Water Supply Agency of Piura)

Chapter 1

INTRODUCTION

In October 1986, Oscar Larrea and Rose Schneider, WASH consultants, traveled to Peru for a 10-day site visit for a final evaluation of the Catholic Relief Services (CRS) three-year matching grant water supply and sanitation project, funded by USAID's Office of Private and Voluntary Cooperation.

This report constitutes an evaluation assessment of the Catholic Relief Services/Agency for International Development (CRS/AID) program in Peru. A total of 14 projects (involving 17 communities) were initiated at a cost of $766,114, of which CRS has allocated $439,879. Projects are concentrated in several areas of the country: in the north are six projects in Piura and Cajamarca; three projects are located near Lima; and five projects are in the south in the Cuzco and Puno regions. Two of the 14 projects are feasibility studies, one in Lima and one in the Piura area. The figures mentioned above do not include the estimated cost for a newly started project in Piura, to be developed by IDECO, to provide water and sanitation facilities for the Ignacio Escudero rural area, estimated at about $359,000.

Annex 1 contains budgetary details of the CRS/USAID matching grant projects in Peru.

The overall purpose of the project is to construct, rehabilitate, and/or expand existing water and sanitation facilities in order to improve health and living conditions in selected areas of the country.

The WASH team met with CRS project management staff upon arrival and carried out an initial document review. Meetings were also held with USAID/Peru staff, and the U.S. Embassy security advisor. The team's travel plans were adjusted due to security precautions. Site visits were, however, carried out in the three communities in the northern desert in Piura, in an urban area of Lima, and in isolated communities in the Puno, Colquemarca area in the Sierra south of Cuzco. Larrea and Schneider extensively interviewed people from Instituto de Desarrollo Comunal (IDECO) and Instituto de Animación Campesina (IAC), the two principal project contractors/project holders; they visited water and sanitation facilities in the communities and met at length with community leaders and members. The team also reviewed health education materials and methods, curriculum and health education resources. After the site visits, a debriefing was held with CRS-Peru and USAID staff in which findings and recommendations were presented and discussed. A draft report was presented to CRS-Peru before the team's departure.

Chapter 2

PROJECT DEVELOPMENT

2.1 Introduction

Catholic Relief Services has demonstrated an exceptional capacity to mobilize resources to develop self-help programs which benefit poor rural communities. CRS has achieved a high level of community organization, with members highly motivated to participate in all phases of the water and sanitation projects. All communities visited have demonstrated that they are aware of their responsibilities for the operation and maintenance (O&M) of the systems and of the benefits of better living standards and better health conditions.

CRS has also demonstrated skills in initiating and supporting interagency relationships, organizing communities, planning, designing and implementing rural water and sanitation schemes with a low capital cost and with high quality construction practices and responsibility.

2.2 Program Approach

Because of the national emergency created by the El Niño phenomenon of 1982-1983, the project was designed to provide water and sanitation services to displaced populations in the north, who had been affected by severe floods, and in the south, where an emergency was created by the El Niño drought.

To implement the project, CRS selected local private voluntary organizations (PVOs) as project holders, e.g., Instituto de Desarrollo Comunal (IDECO-VICUS) in Piura and Instituto Animación Campesina (IAC) in the south. Both are working in areas visited during the evaluation.

IDECO is a PVO in Piura which has been assisting residents in their reconstruction efforts -- using people-based initiatives. Local municipalities and public service corporations, i.e., Corporación de Desarrollo de Piura (CORPIURA), are also collaborating in the program. In the south, IAC, coordinated by the Prelature of Sicuani, has been working on an integrated development project for different peasant farmer communities.

Chapter 3

COMMUNITY SELECTION AND PARTICIPATION

3.1 Criteria for Selection

CRS-Peru has established a major criterion (need for water and sanitation improvement) for the selection of communities to receive development assistance -- recognizing that the provision of water and sanitation services must be addressed to improve health and living conditions. In developing water supply and sanitation projects, CRS supports the use of low-cost technology for water and sanitation services. The strengthening of community organization and active participation by the community are other important aspects emphasized by CRS (so that communities become capable of defining and analyzing their health problems and become capable of implementing water and sanitation projects).

Another criterion is to support community activities related to other improvements in health, nutrition, and health education.

In applying these criteria to the field, project holders strictly adhere to them and have developed a consistent strategy which calls for the communities to organize themselves and to assume responsibilities during the design and construction of the schemes and, later on, for the operation and maintenance of the systems.

3.2 Size of Communities Selected

Communities selected in the different regions of the country have varied greatly in size, health conditions, socio-economic situation of the population, urgency of need for water and sanitation facilities, and the availability of water sources and other parameters that are found during the basic community survey.

The WASH team visited the communities of Ignacio Escudero, San Pedro, San Miguel, San Jose and Montelima and Bellavista in the Department of Piura in the northern desert and, in the Department of Cuzco, the Unupulla community in the south. The communities in Piura that were selected are from a large multipurpose master plan for urban consolidation which was designed as a result of the El Niño flood. Table 2 in Annex 1 provides further details on the communities that were selected. (See Annex 2 for CRS forms used during the community selection process.)

For the north's water supply systems, Ignacio Escudero and San Pedro are considered one integrated project benefiting approximately 7,851 people. San Miguel and San Jose are also integrated in one project with a population of 2,571 inhabitants. Montelima is being designed as an independent system because of the long distance from the nearest village, which is San Jose.

IDECO-VICUS, a nonprofit private organization in Piura, was selected as project holder and is responsible for the entire project funded under the CRS/AID matching grant. The Ignacio Escudero-San Pedro project initiated the construction of the water system on August 3, 1986, while San Miguel-San Jose and Montelima projects are in the process of organizing the community, purchasing materials, beginning health education, and preparing training materials. In Bellavista, construction of the distribution system has recently been completed, but the house connections have not yet been made. It is a Sullana peri-urban community which grouped three settlements, Jose Carlos Mariategui, Esteban Paletich, and Jorge Basandre, that built their own houses after the 1983 flooding and did not have access to municipal water service. The project, once connections are finished, will provide house-connected potable water to about 3,100 people.

3.3 Levels of Service and Community Coverage

Basically, CRS provides house connections or public taps. The former must be purchased by the households directly from the municipality or through a revolving fund established by the same authority.

Piura's projects are designed to provide 150 liters per capita per day (lpcd) which complies with national standards (Reglamento Nacional de Construcciones) for villages ranging from 2,000 to 10,000 inhabitants living in hot climates. For public taps, designs are intended to provide 30 lpcd for human consumption.

Southern communities visited in the Department of Cuzco are designed for 30 lpcd, in accordance with national standards for rural Sierra communities. These communities are located at an altitude of more than 3,000 meters above mean sea level and have a cool climate. (See Annex 3 for selected community photographs.)

In the north, in the finished project of Bellavista, the current percentage of coverage for water is about 80 percent of households; the rest are to be connected by February 1987 through the use of a revolving fund. The WASH team noted that, in spite of the fact that the project was finished a few months ago, new houses are being built which, as of yet, have no access to the distribution system. The coverage at the three new projects in the Ignacio Escudero area will probably be more than 80 percent because of solid community organization and strong promotional efforts made by IDECO-VICUS.

Sanitation services are not provided as part of the project at Piura. The municipality provides some materials like cement, sand, and bricks. The health authorities provide some equipment and technical assistance. The community contributes labor and the "caseta" (structure housing the latrine). IDECO- VICUS will finance the first 100 latrines and give technical assistance. However, an implementation plan has not yet been designed.

3.4 Community Organization and Participation

In the projects visited in northern Peru managed by IDECO, an extensive plan for overall development was carried out with in-depth involvement of the communities in the decision-making process.

The community organization for water and sanitation project components followed from this overall active participation. The placement of main pipes and tanks was discussed extensively with the community. The participation of the community in decisions regarding the placement of taps at individual houses, however, was more limited.

In the south (Cuzco region), CRS's water projects with the project holder, Instituto de Animación Campesina (IAC), are one component of IAC's broad community development approach. The communities have assessed their need for potable water and have actively participated in installation and repair.

3.4.1 Committee Election and Involvement

In the north, in most cases, a water committee was elected by the community and given responsibility for planning, storage of materials, construction, etc. Again, in most cases, the water "construction" committee, when the system begins operating, is responsible for the operation and maintenance and collection of fees for future repairs. Closely associated with the formation of water committees is the formation of sanitation committees with responsibility for promoting latrine construction and maintenance.

The urban project in El Planeta, Lima, due to a long history of direct involvement of the Junta in the development of the project, did not need to form a separate water committee.

In the south, water committees were elected and were responsible for installation and operation and maintenance (O&M). No separate committee for O&M was formed. The communities' health committees are responsible for education in water use, personal hygiene, and environmental sanitation.

3.4.2 Participation of Principal Users

In the north, women are involved to a considerable degree in the decision-making and in the election and training of health and sanitation committees. They appear to have been involved in the decision-making process of the placement of main pipes. Some worked on the construction. It was not clear if principal users participated in decisions regarding the "micro-system," the system inside the property boundaries, because some of the choices resulted in inconvenient placement of taps for optimum household use.

In the south, women do not appear to be actively involved in the decision-making on issues of water pipe placement. Health and water committee structures are predominantly male. It is not certain, however, if women participated in general assembly discussions of water and sanitation issues.

Chapter 4

SYSTEM DESIGN AND CONSTRUCTION

4.1 Criteria for Water and Sanitation Systems

IDECO design criteria for the three new projects in the Ignacio Escudero area follow the Reglamento Nacional de Construcciones and the standards set by Servicio de agua potable - Piura (SEDA-PIURA). The basic design data are as follows:

a. The Rational Method is the formula commonly used to calculate the design population. It is calculated below as:

   Pf = Pa (1+I)T

   Pf - Design population
   Pa - Present population
   I - Annual increase in population. A fixed amount of 60 persons per year is accepted.
   T - Design period

b. 150 lpcd is the average daily consumption (ADC) with an increment of 30% for the maximum daily consumption (MDC). The maximum hourly consumption is calculated as 2.5 MDC + 24 (which is 3.25 times the ADC).

c. The design period for the projects evaluated in Piura is 30 years, which is longer than the 16 years recommended by the Reglamento Nacional de Construcciones. Three principal reasons for this change are given:

   - Rate of allowable population increase is small (60 persons per year)
   - Low income which does not allow the population to finance new systems in the future
   - Average durability of the components of the systems, including equipment is greater than 16 years

The WASH team does not totally agree with this last criteria because, at least for the projects San Miguel - San Jose y Montelima, cost estimates should be made calculating for equipment like electrical pumps, engines, etc., with life expectancies of 15 years under severe service conditions. Hence, probably two pumps will be needed during the design period.

For the small rural communities, the design criteria provide enough water through the installation of public taps to allow an average daily consumption of 30 lpcd with a factor of 10 percent for losses at the spring water intake and throughout the pipeline system.

For the Ignacio Escudero rural area in Piura, the distribution system was designed for 4" and 3" AC class 105 pipes. However, due to a shortage of that material in local markets, IDECO and CRS agreed to change the specifications and to use PVC equivalent pipes for a part of the scheme in San Miguel-San Jose area, and for the Montelima project as well. PVC material is available in local markets, and its price is within the project budget.

Considering that communities are served with only one tap per home and the possibilities for rapid upgrading of the system are relatively low, those communities would still have sufficient water for their needs during the design period. Those systems which have the river as their water source have enough water all year.

In the Department of Cuzco, the beneficiary communities visited are located in the rural area of Chumbibilcas Province. Natural springs are captured and the water piped to a reservoir and to public faucets in the communities. According to data provided by CRS, the source springs are rated at from 0.1 to 1.0 liters per second. Communities are isolated from each other over mountainous area with altitudes between 3,300 and 4,800 meters above mean sea level. The small size of these communities limits the consumption of water so the amount produced at the springs is enough for human and domestic animal use.

No design criteria have yet been established by CRS, IDECO, or IAC in order to implement a program for sanitation services. The MOH has a comprehensive design which could be easily adapted to local conditions.

4.2 Materials and Methods of Construction

In the north, in general, materials and methods of construction were found to be acceptable. People in charge of pipe installation and community leaders are well trained in the methods of installing AC pipes and house connections. SEDA-PIURA makes the hydraulic test for the systems as well as an analysis of source water quality at all sites. The results of those tests and analyses were not made available to the WASH team, because the person responsible for the records was on leave during the time that the team was in Peru.

At the already completed project of Bellavista, the team observed that there were no chambers to protect shut-off valves for service connections.

CRS construction criteria for pipe-laying, trench depth, bedding materials, service connections, and intake structure were found to be acceptable.

4.3 Management

The Bellavista project construction was finished in five months. The Ignacio Escudero-San Pedro project construction will be completed in seven months; Montelima, in eleven months; and the small projects in Chumbibilcas Province of Cuzco have a construction period of three months each.

This success can be attributed to several factors:

- Good selection of project holders
- Decentralized control of the projects
- Speedy and efficient CRS support
- CRS monitoring of the projects
- High level of community motivation that CRS generated during all project phases
- CRS activities generally accepted by community people

4.4 Financing and Economic Aspects

In general, CRS water projects in Peru have considered the following cost aspects to varying degrees:

- Cost of materials and technology
- Capital cost and recurrent cost
- Community contribution and willingness to pay
- Economy of scale

1. Cost of Materials and Technology

   A cost comparison of two or more alternatives for materials and equipment is always made by the project holder before the construction begins. Whenever possible, the CRS project holder selected the gravity system for the scheme to eliminate the cost of pump purchase, operation, and maintenance.

2. Capital Cost and Recurrent Cost

   In the north, for the Bellavista project, the community is paying U.S. $1.50 per month per house connection, which covers the operation and maintenance costs including chlorination.

The capital cost was cited as U.S. $65,899 with a grant contribution of 72 percent of the total cost. Per capita cost ranges from U.S. $17.70 per person for the present population to U.S. $14.91 per person for the design population. These are inexpensive projects.

At present, for Ignacio Escudero in the north, water is pumped from a river to a treatment plant which is not operating as it should due to a lack of adequate maintenance. Water then goes to a reservoir which also shows signs of faulty maintenance. No chlorination is provided to this existing system. The water source for the new Ignacio Escudero scheme will be the main city public works system, which clearly needs to be improved and properly operated and maintained.

The total cost for the new Ignacio Escudero project is estimated at $359,174; the grant contribution will be approximately 38 percent of the total cost. Communities served by this system will have house connections costing $8.70 each. O&M costs must be considered as part of the recurrent cost, and fees should be high enough to pay for such costs. Community water committees will collect fees for O&M and a small amount for capitalization and future expansion.

In Montelima, the CRS project holder in Piura decided to change the designs for that system; the original idea of having a sophisticated, package water treatment plant evolved to an easy-to-maintain, slow sand filtration plant, so the capital cost and the O&M cost will be reduced considerably.

In the south, small public tap systems have a low capital cost, and the O&M cost is established as a community responsibility to guarantee proper functioning and durability of the schemes. Water sources for projects in the south are generally natural springs. Although this is adequate, chlorination could be considered as an upgrading step, as well as the installation of house connections.

Per capita cost for the Chumbibilcas projects in the Cuzco area is $5.57 for the present population and $4.08 for the design population.

3. <u>Community Contribution and Willingness to Pay</u>

All communities, both in the north and in the south, actively participate in the decision-making in the different phases of the project. During the planning stage, the community participates in the selection of the level of service, the water source, materials, and future management of the system. During the construction phase, the community contributes unskilled labor, local materials, and cash. Later on, the community organizes the O&M committee, which is responsible for operating, maintaining, and managing the system, collecting fees, etc.

Project holders in both north and south have assessed the community capacity and willingness to pay for water; the level of service has been designed considering these factors. Households in Ignacio Escudero's new project will have access to a revolving fund for patio connections. This will be established by the municipality to finance water connections and sanitary facilities.

Surveys made indicate that a high percentage of the population is willing to pay for water. Rates for Ignacio Escudero's new system will be less than what people are now paying for contaminated water transported by mules.

4. Economy of Scale

In the north, the new Ignacio Escudero project will provide water for the following communities:

- Ignacio Escudero (peri-urban area)
- San Pedro
- San Miguel
- San Jose

Taking into consideration the economy of scale derived from the possibility of having a common source, structures, reservoir, etc., the system has been integrated as follows:

1. Ignacio Escudero-San Pedro, and
2. San Miguel-San Jose

In the south, the concerns of economy of scale are less pressing because the communities are isolated and have their own natural spring source of supply.

Chapter 5

SYSTEM OPERATIONS AND MAINTENANCE

5.1 Introduction

One of the principal factors that indicates whether or not a system could be expected to continue functioning over the design period is the operation and maintenance system. Communities in the CRS project are responsible for the operation and maintenance of the rural water systems with little financial assistance from outside, so they have to generate enough funds to cover O&M costs over the years. (See Annex 4 for list of key individuals contacted.)

5.2 Organizational Aspects

In the northern projects visited, the communities have developed water committees charged with responsibility for construction, and operations and maintenance committees, which sometimes are the construction committee personnel themselves.

In addition, a committee to monitor water use was formed, because the type of community development model used stresses individual responsibility and initiative. It should be noted that not a single tap was observed to be left open by the users.

Training materials developed by CESEPAC (Centro de Sevicios de Pedagogia Audio-Visual para la Capacitación), in collaboration with CARE, are being studied by CRS groups in the north to develop operations and maintenance procedures for the projects.

In the south, a single water committee is responsible for operations and maintenance. In the communities visited, the several repairs which have been needed in the initial months of operation have been rapidly dealt with by these committees.

5.3 Operational Status

The communities with completed systems visited during the evaluation have had the systems operational for only a few months. In the north, systems were functioning smoothly. The O&M responsibilities lie with the city water authority although the communities raise funds to pay for maintenance and repairs.

In the south, in general, there is a faulty construction practice where there are pressure reduction tanks: float valves have not been installed because appropriate technical assistance is not available. Systems were put in operation without such pressure regulating valves. This has sometimes produced blow-outs in the lower part of the distribution lines, especially at night when the entire pipeline is filled with water and the tank is overflowing. This and other accessories are more likely to produce leakages.

5.4 Constraints

If a new system is not in good condition it may be due to errors in design, construction practices, poor selection of materials, or inappropriate O&M procedures. All these constraints can reduce the efficiency of a system and increase the cost for O&M.

In the south, most of the communities studied are very remote, accessible only through poor roads, on horseback, or on foot. This constraint makes successful O&M and supervision difficult.

Chapter 6

HUMAN RESOURCES DEVELOPMENT

6.1 Selection of Personnel

Counterpart project personnel were hired on the assumption of technical competence in their respective areas of responsibility. CRS did not directly participate in the hiring of these counterpart project personnel. This responsibility was assumed by the project holders. The evaluators were not able to establish the criteria for selection. In the north, personnel were selected who had very strong community organization skills and experience, but who were less strong in technical engineering and health education. Fortunately, in the south an expatriate nurse strengthened the health education skills of the counterpart project holder, but the team was unable to find staff with strong technical engineering skills.

CRS-Peru personnel served as managers and did not have specific engineering or health education skills. Responsibility for project management was shared by several staff members.

6.2 Training of Personnel

No training was funded by the project for its counterpart personnel. No interchange among various CRS-funded counterpart project personnel in meetings or communication was funded or institutionally encouraged by CRS. It was stated by CRS, however, that often project information exchange takes place among project personnel because of their other institutional affiliations.

The inclusion of counterpart personnel in training courses given by the government or other private agencies did not take place. The possibility of collaboration of a group of PVOs for basic training of counterpart personnel was discussed at CRS at some time during the matching grant, but a training course or conference for interchange did not take place.

CRS-Peru staff did not take part in training in water and sanitation as part of this project. Informal training, primarily in engineering aspects, was provided by CRS-New York through technical assistance visits.

Chapter 7

HEALTH, SANITATION, AND WATER USE EDUCATION

7.1 Community Health Education Approach

In the north, water and sanitation are two components of a twelve-component development project for the communities, funded from a variety of sources.

IDECO, the organizing agency for the overall development effort, working with local Ministry of Health (MOH) personnel, has developed a 50-hour water and health training course.

Community leaders are selected and trained in a series of two-hour sessions, three afternoons a week, taught by MOH personnel and coordinated by IDECO.

These leaders gain knowledge and develop simple health education materials. After their course, they then train small groups in their communities using the health education materials developed. Training in sanitation, latrine use, and environmental and personal hygiene will also be taught using the same approach; however, different trainees will be selected in order to spread the base of leaders trained.

7.2 Criteria Established

In the north, the health education curriculum criteria developed were designed to meet broader health needs than water use.

IDECO, working with the Ministry of Health local office, included the following in the basic curriculum: information on Peru's health system, analysis of health education needs, participative techniques, social promotion, and a considerable amount of information on first aid. Water use, conservation, and storage are not specifically addressed in the curriculum outlines nor are specifics on latrine maintenance included. However, in an interview, an IDECO promoter was able to state clearly the changes in behavior in regard to water use which participants were expected to make as a result of the course.

The health education materials developed during the leaders' course were definitely related to water and sanitation use.

7.3 Coordination with Construction and Maintenance

In the north, water committees were formed to organize the community and construct the water systems. Because the water project is part of a larger development effort, coordination with some of the other 12 components was also taken into consideration.

Health education courses for community leaders, which have recently begun, are appropriately timed to water system installation.

Sanitation courses, however, are being given in advance of latrine installation with a combined agenda of motivation and education of the participants. Courses for operations and maintenance have not yet been planned in the north.

7.4 Materials and Methods Used

In the north, it was painful to note that training materials were not made available by the central office to serve as sources for IDECO and MOH local offices. It was not clear why training and source materials on water and sanitation were not made available as an integral part of the project and had to be developed separately at the local level. Such materials are used by the Project Holder's staff during their community organization meetings and promotion activities during and after the project.

During the first leader's health education course, participants developed small, simple drawings done in pencil with health messages printed on the reverse side which could be used in this training course. In a brief review of these materials available in the Regional Health Office, they seemed solid, appropriate health education materials for use in further training of community participants. MOH nurses have prepared some posters to be used in schools for health education. A poster was seen in the IDECO office which contained information on latrine construction and maintenance, but in the communities few materials, posters, pamphlets, and handouts were available to reinforce health messages.

7.4.1 Household Water Use

In the north, general themes on water contamination and the need for clean water and its protection were developed for upcoming courses. The appropriateness of the materials developed by participants of the first health education course was striking. More personal hygiene materials could be developed.

7.4.2 Sanitation Practices

In the north, water, sanitation, and health education materials could not be completely separated. Some posters were seen in the IDECO office on latrine construction and maintenance but in general the presence of health education materials to emphasize water use and environmental sanitation were limited.

7.5 Funding Allocations

In the north, $7,500 was allocated for training courses and materials. It appears that no resource materials were bought with these funds but materials were developed by IDECO staff in preparation for the courses and, during the courses, by participants.

7.6 Constraints

In the north, IDECO personnel, with the exception of one promoter who was trained in nursing, do not have strong skills in technical health and sanitation issues but do have good promotion and community development skills.

This limits their ability to develop the specific technical aspects of health education; they have wisely coordinated with MOH technical personnel with the intent that IDECO personnel will upgrade their skills by participating with MOH in joint health education efforts. The development of materials for health education also requires certain technical skills which are not in full evidence in IDECO.

The training and health education effort was further constrained by the almost total lack of water and sanitation health education and training resource materials which might have been made available through the project.

Chapter 8

ADMINISTRATION AND MANAGEMENT

8.1 Institutional Arrangements

CRS-Peru contracts the water and sanitation project implementation to several project holders (sub-contractors) and works intensively with these groups in the pre- and early-project period to establish the standards for project implementation. The project holder then signs a contract agreeing to carry out these responsibilities, including community surveys, purchase and transport of supplies, record-keeping, etc.

8.2 Coordination

CRS management of the project has been shared by several staff members during the course of the project. Coordination and communication with project holders is mostly by telephone with infrequent site visits. The project holders have considerable autonomy for project implementation.

The project holder agreement covers the following points:

- Title and number
- Description of the problem
- Objectives
- Beneficiaries
- Report system
- Funding
- Identification of person and institution or agency legally responsible for administration and implementation of project in accordance with local laws
- Local support
- Description of the project

Local project holders then assist communities and sign a contract with them establishing the responsibilities of each group in the implementation of the project and the timing for its completion.

8.3 Current Funding Status

Current funding status can be analyzed in Table 1, Annex 1. Also, Tables 3 through 6 in Annex 1 provide data related to the funding for the projects visited during the evaluation.

8.4 Information Systems

Periodic reporting from project holders is incorporated into the project's management system. More consistent project management from CRS would allow technical indicators of project progress to be developed to complement the current emphasis on administration and financial information.

8.5 Project Monitoring

CRS enjoys strong informal communications with the project holders which supplements written report information for project monitoring. Distance constrains frequent site visits, especially to projects in the south. CRS recognizes the need for strengthening project reporting to monitor basic indicators of progress, while at the same time not burdening project holders with extensive monitoring/reporting requirements.

8.6 Inventories

In the northern Peru projects, inventories of materials and supplies have been well documented, with changes made during construction noted. The same procedures will be followed for projects being started in adjacent areas. Sufficient materials are usually available and response time by CRS-Peru after requisition is short.

In the southern projects which the team visited, there were well-prepared lists of all the materials used in the project sites. Communities kept these lists for their records. Response rates by CRS were somewhat longer, influenced by distance and difficult communication. Reserve supplies for system repair were negligible; basic equipment for communities to carry out basic O&M and repair is not yet available.

Chapter 9

PROJECT EFFECTS

9.1 Introduction

As a result of the water and sanitation projects implemented through CRS/AID matching funds, some effects are possible to identify based on the observations made during the evaluation. It is expected that those positive benefits will expand further as latrines and improved household sanitation complement the existing water systems. The project goal was to provide access to adequate, safe water supplies and improve environmental and household sanitation with the installation of latrines and improved hygiene measures and habits. Adequate baseline health statistics on water- and sanitation-related mortality and morbidity were not available for comparison with current information. Increased water supply of relatively high quality and the initiation of latrine construction can be linked to the positive project effects that follow.

9.2 Social Effects

- Community members now have a very clear perception of the positive effects that good quality water, in sufficient quantities, would have on the overall health status of the population. They have been willing to organize work brigades to build the system and to attend health education classes in water use and sanitation.

- Women have played an important role during all stages of the negotiation and implementation of services. They are more confident about assuming additional responsibilities for the operation and maintenance of the schemes.

- Community organization is now strong and additional projects, such as home gardens, have resulted from an increased water supply. There is the need for other services to complement the water and sanitation assistance and further broaden development in these communities.

- CRS water and sanitation projects have provided visible signs of assistance from outside the communities, reducing the sense of isolation and abandonment, felt especially in the south.

9.3 Economic Effects

- The monetary savings for community members is already evident, especially in projects like Ignacio Escudero in the northern desert and similar ones where the population pays up to $5.00 per month for contaminated water carried by mules from the river 8-10 km to the village.

- Further economic benefits can be gained by production of a home garden, with vegetables and fruits for consumption and sale.

- It is expected that the contribution of water and sanitation to improved economic and health status would reduce the amount spent on curative health (doctor or clinic visits), and can be used for other family expenditures. Waterborne diseases severely affect populations with reduced access to sufficient quantities of safe water and inadequate sanitation facilities and hygiene habits.

- Household garden production has led to increased consumption of staples, vegetables and fruits especially in the northern projects. In both northern and southern project sites, seeds, gardens, and related technical assistance have been linked with the water and sanitation projects.

- Water quality has not been controlled. The large systems in the north require major sand filtration and chlorination because the river serves as the water source.

  In the south, smaller mountain streams are not yet chlorinated but appear to be high quality water sources.

9.4 Health Effects

- In Peru, most of the communities have installed water systems with adequate water supplies of reasonable quality. Waterborne diseases appear to have decreased and are expected to decrease further as health/sanitation education and facilities decrease environmental and household contamination.

- Increased supplies and individual household taps encourage increased water use for washing clothes and dishes, and cleaning the household. This is expected to decrease contamination and contribute to the positive effects gained by actual consumption of clean water.

- Significant positive health effects result from improved water quality, quantity and improved sanitation facilities and habits. In Peru, installation of facilities will improve health status, however, significant health habit changes are needed to further improve health effects.

- The Peru water and sanitation projects have served as a component and catalyst for more comprehensive health and community improvement efforts.

Chapter 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 Project Development

10.1.1 Conclusions

1. Under the CRS/AID matching grant project for a water and sanitation program in Peru, a total of 14 projects (17 communities) were initiated at a cost of $766,114, of which CRS has allocated $439,879. Six projects are in Piura and Cajamarca; three located near Lima; and five in the Cuzco and Puno regions. Two of the 14 projects are feasibility studies.

2. Because of the national emergency created by the El Niño phenomenon of 1982-1983, the Peru program was designed to provide water and sanitation services to displaced populations in the north, who had been affected by severe floods, and in the south, because of the emergency created by the El Niño drought.

3. To implement the project, CRS selected local PVOs as project holders, e.g., IDECO-VICUS in Piura and IAC in the south, both working in areas visited during the evaluation. This mechanism proved to be a good one.

10.1.2 Recommendations

1. CRS should consider concentrating projects within certain regions of the country to increase the coverage with water and sanitation services more efficiently.

2. Because the effects of the El Niño phenomenon still exist, it is recommended that CRS continue to provide water and sanitation services to communities located within the affected areas.

3. CRS criteria for selecting project holders should be applied any time a new project is approved.

10.2 Community Selection and Participation

10.2.1 Conclusions

1. Criteria applied for community selection are acceptable and include parameters of socio-economic need, health conditions, need for water and sanitation facilities, water availability, and others.

2. Communities of different sizes were selected: small ones with populations up to 500 people, medium-sized ones with populations from 500 up to 1500, and sometimes peri-urban areas with more than 1500 people.

3. CRS has established public tap systems for small communities, with the option of patio connections as a future development. Piped water with inside house connections is the level of service being developed for the larger, denser urban projects.

4. CRS project holders have developed the water project as part of their more comprehensive community development approach. Community participation--in overall planning, decision-making, construction, and operations and maintenance--is very active. Less apparent is attention to decision-making regarding the location of yard taps. A closer study of stimulating the community in latrine construction and use is needed. Women, the principal users, are involved to varying degrees in the decision-making process.

10.2.2 Recommendations

1. For future projects, consideration should be given to allocation of funds for technical assistance in both engineering and health, and water and sanitation education during all project phases.

2. CRS should address the need for more projects for rural areas where small, isolated communities and medium-sized villages are in need of financial assistance to build their water and sanitation services. The present population size limit could be extended to 2,000.

3. In all cases, designs should provide allowances for system up-grading when the population can afford such improvements. Coverage of the whole population must be accomplished as far as possible to guarantee good health protection.

4. Future attention to the location of yard taps (in consultation with users) should be considered. Since this system more heavily affects women as principal users, their input should be sought. A concentrated effort to stimulate latrine construction and use should be given priority.

10.3 System Design and Construction

10.3.1 Conclusions

1. In general, both in the northern and southern projects, design criteria for the water system and structures were found to be appropriate and acceptable. No design criteria exist for sanitation facilities.

2. Materials used for the water projects, both in the north and south, as well as the technology applied for the construction are acceptable. Pumping equipment and the slow sand filtration treatment plant will be required for the system that will serve Montelima, for which technical assistance is advised.

3. The short period of time for CRS project construction to be completed is a notable achievement: five to eleven months in the north and three months in the south.

4. Initial capital costs and maintenance costs per capita for water systems in CRS projects were modestly low. This argues for continued efforts, especially given the investment already made in start-up of the CRS/Peru program.

10.3.2 Recommendations

1. During the design periods, CRS project holders must follow the standard criteria recommended by national and/or regional authorities. Any change should be fully justified.

   Designs must be completed with water quality analysis results from the water source made at least once during each rainy and dry season.

   Technical assistance could be provided to evaluate the communities' sanitary needs and to design the most appropriate technology for latrines both in the north and in the south.

2. Further funding for continued CRS water and sanitation projects should be considered, given the moderate per-capita cost and the significant investment of time and organization in these isolated, underserved areas.

3. When using PVC pipes, care must be exercised in handling and storage to prevent damage or deterioration of materials.

4. For new projects, it is recommended that there be an allowance of time and funds for technical assistance during project design, implementation and the beginning of the O&M phases. More frequent CRS monitoring of the projects, especially the technical aspects, is recommended.

10.4 System Operations and Maintenance

10.4.1 Conclusions

1. All communities are willing to pay for the cost of operations and maintenance and even to set aside some capital for future expansions. Even the small farm-based communities in the south, which are not paying fees at this time, are willing to do so if required.

2. All CRS projects will need to have technical assistance from CRS to design the O&M system and to train personnel in the selection and use of equipment and tools.

3. Accessibility to some communities, especially in the south, is a great constraint which makes it difficult to perform adequate O&M.

10.4.2 Recommendations

1. After the construction is finished, all the communities should continue to receive a promotion and education program in order to keep their motivation high and to pay for O&M.

2. CRS should provide assistance to communities for the development of appropriate O&M plans, the selection and training of operator and "Junta" members, and the selection of tools and equipment needed.

3. To facilitate O&M in hard-to-reach villages, CRS must provide assistance in designing an appropriate set of O&M procedures to be applied in each individual case and in monitoring it as often as possible.

10.5 Human Resources Development

10.5.1 Conclusions

1. The project holders chose their own personnel; CRS did not play a significant role.

   In the north, personnel were selected with strong community development and promotion skills but with less strong technical engineering and health skills and experience.

   In the south, a technically-experienced expatriate health person/nurse played a key role in project development and in the development of the health education component.

2. No training of project personnel was funded by the CRS project. Interchange with other institutions was not encouraged, nor were there meetings for interchange among the CRS project holders.

10.5.2 Recommendations

1. Although decentralized decision-making is of great importance, CRS should play a stronger role in helping the project holders work through the specific skills they need for their personnel.

2. Due to the importance of training and information interchange, CRS should consider a line item in the budget during project design to assure adequate funding.

   Use of technical assistance funded by the project or from central USAID funds to assess training needs and develop courses may also be needed. If funding for training is limited, existing materials may be used to fill the training need. Even if training funds are adequate, CRS should seek out and receive national and international written materials on community development, and technical water and health education to supplement training.

10.6 Health, Sanitation, and Water Use Education

10.6.1 Conclusions

1. The community health education approach varied considerably by project site. CRS in general did not play an active role or provide outside technical assistance in the design or implementation phases, depending heavily on the project holder instead. There did not appear to be a clear definition of the health education approach to be used, nor adequate attention or technical assistance from CRS staff to give this area the direction and development needed.

2. Coordination with construction activities was good. Information on water and latrine use was not developed in great detail. Health education and community development materials were painfully absent in the northern sites, as well as in the CRS office.

10.6.2 Recommendations

1. The overall approach to health education by the project holders should be strengthened by CRS in the following ways.

   a. Encourage and facilitate interchange among project staff through correspondence, site visits, conferences, etc.

   b. Obtain and provide national and international health education and community development materials for use by project staff.

   c. Provide CRS staff other technical input to strengthen the health education and community development approach, curriculum development, community training, and materials development.

   d. Strengthen health education and community development as an integral part of project development, not separated as an "add on" activity.

10.7 Administration and Management

10.7.1 Conclusions

1. For the projects visited during the evaluation, CRS had contracted the total implementation of the projects with local PVOs. Local PVOs then signed contracts with the communities establishing the responsibilities of each participant agency in the implementation of the project and the timing for its completion. CRS periodically monitors the project.

2. Project coordination depends principally on written or telephone communication rather than frequent site visits. CRS input was stronger during the early project design phase. Because the project holder is given a great deal of autonomy in the implementation, coordination focuses more on administrative matters than on technical and content issues.

3. For the Bellavista project, IDECO has updated information which contains details of all changes introduced during construction. In the south, there is a good list of all the materials used in the schemes.

4. Periodic reporting requirements were established by CRS for the project holders. These were not always met with promptness. In general, the reporting and information system focused more on financial and administrative matters and less on technical and community issues. A lengthy system of information reporting is not desirable; brief periodic reporting and a concise information system that covers all critical project elements would be helpful as a basis for project monitoring.

5. Since project holders in Peru have considerable autonomy, CRS project monitoring is somewhat restrained. Good relations exist between CRS and the project holders, and the early-stage project design cooperation perhaps allows less active interim monitoring. Still, sensitive interventions by CRS to monitor and offer technical and administrative assistance could have been more frequent and active.

10.7.2 Recommendations

1. For future projects, because of the success of CRS in using local PVOs for implementing water and sanitation projects, it is recommended that CRS apply the same criteria for selecting additional PVOs.

2. CRS should supplement its assistance to the project holders during the design phase with more frequent contact and support in the technical and content areas.

3. To keep a record of all the changes made in each system during the construction, it is recommended that all project holders keep records of all materials used, the type and cost of labor, location of all elements, etc. This will also facilitate O&M activities.

   Detailed cost analyses must also be kept at local, project holder, and CRS levels.

4. A balance should be struck between the adequate reporting and information systems needed and the time and effort required to prepare these documents. A review of the information system should be done to assure that key matters are addressed and that a balance between administrative and technical areas is struck.

5. CRS, while allowing considerable autonomy to project holders, could provide project monitoring which would identify and address some of the project holders' technical and administrative needs.

10.8 Project Effects

10.8.1 Conclusions

1. Communities have experienced success in organizing and implementing water and sanitation systems. This success with the skills learned has allowed them to take on additional development activities. Women, especially in the north, have been active participants and have contributed to project success.

2. CRS project support has provided visible assistance to isolated communities, reducing their sense of abandonment.

3. Community members now have a very clear perception of the positive effects that good quality water would have on the overall health status of the population.

4. Community organization is now strong and there is the need for other community services to complement water and sanitation.

5. In some communities where the population pays up to $5 a month for contaminated water, the monetary savings that people are going to have is already perceived.

6. Home garden production for consumption and sale can provide further economic benefits.

7. Among the diseases present in the communities, there are a number attributed to the lack of potable water and sanitation facilities. Increased water supplies contribute to improved personal and household hygiene, in addition to clean drinking water.

8. Health and nutrition should improve with consumption of foods, fruits, and vegetables produced in home gardens, made possible by the water project.

10.8.2 Recommendations

1. CRS must continue providing assistance to the local committees organized to support water and sanitation projects. This is important to guarantee the durability of the schemes and to improve health. Women must play an important role in the O&M process and in the decision-making and implementation of related new projects.

2. In all possible cases, CRS and project holders might prepare a simple cost study to demonstrate to the communities cost and/or time savings from the impact of new water systems.

3. Coordination with health authorities should be strengthened to determine changes in health indicators due to water supply and sanitation projects.

4. Further health education is needed to influence personal and environmental health improvements.

ANNEX 1

Selected Project Information for Peru

Table 1 - Peru Projects under the USAID/CRS Program

Table 2 - Selected Data on CRS Projects in Peru

Table 3 - Chumbibilcas Project Funding Analysis

Table 4 - Ignacio Escudero Project Funding Analysis

Table 5 - Bellavista Project Funding Analysis

Table 6 - Bellavista Project Budget Itemization

Table 1

PERU PROJECTS
UNDER THE USAID/CRS PROGRAM

	Name	Type	Total Cost	CRS Cost	PCTG.	Benef. Pres.	Benef. Design	T. Cost/ Capita	T. Cost/ Capita Design
1.	Moran Lirio	GP	$ 23,295.00	$ 18,645.00	80.04%	500	750	$46.59	$31.06
2.	Ahijadero	GP	15,128.00	11,175.00	73.87%	500	750	30.26	20.17
3.	Paquilla	GP	8,650.00	6,360.00	73.53%	220	330	39.32	26.21
4.	San Jose	GP	6,599.00	4,822.00	73.07%	120	180	54.99	36.66
5.	Yanamayo	GP	16,150.00	12,650.00	78.33%	800	1,200	20.19	13.46
6.	El Planeta	EPH	92,998.00	60,500.00	65.06%	7,500	11,250	12.40	8.27
7.	Amparaes	GP	23,981.00	14,938.00	62.29%	1,500	2,250	15.99	10.66
8.	Chumbibilcas	GP	13,024.00	11,939.00	91.67%	2,340	3,510	5.57	3.71
9.	Huaje	GP	12,410.00	8,100.00	65.27%	480	720	25.85	17.24
10.	Bellavista	MEH	65,899.00	47,200.00	71.62%	3,726	5,589	17.69	11.79
11.	Cumbemayo	GP	36,592.60	28,758.00	78.59%	1,200	1,800	30.49	20.33
12.	Espinar	GP	50,000.00	43,887.00	87.77%	4,011	6,017	12.47	8.31
13.	Ignacio Escudero	MEP	359,174.00	137,813.00	38.37%	11,928	17,892	30.11	20.07
14.	Shudal	GP	12,878.00	10,309.00	80.05%	150	225	85.85	57.24
15.	El Milargo	GP	9,706.00	7,801.00	80.37%	150	225	64.71	43.14
16.	Los Naranjos	GP	3,901.64	3,355.52	86.00%	140	210	27.87	18.58
17.	Moran Pata	GP	4,335.00	2,734.00	63.07%	400	600	10.84	7.23
	Sub Totals		**$754,721.24**	**$430,986.52**	**57.11%**	**35,665**	**53,498**	**$21.16**	**$14.11**
	Feasibility Studies		$ 6,500.00	$ 4,000.00	61.54%				
	Feasibility Studies		$ 1,400.00	$ 1,400.00	100.00%				
	Evaluation		$ 2,000.00	$ 2,000.00	100.00%				
	Evaluation		$ 500.00	$ 500.00	100.00%				
	Evaluation		$ 992.40	$ 992.40	100.00%				
	GRAND TOTAL		**$766,113.64**	**$439,878.92**					
	Averages		$ 44,395.37	$ 25,352.15	73.47	2,098	2,675	31.25	20.83

Notes: E = Electric Pump
G = Gravity System
H = Household Connections
M = Municipal System
P = Public Standposts

Table 2

SELECTED DATA ON CRS PROJECTS IN PERU

NAME	LOCATION	WATER SOURCE	TYPE OF SYSTEM	STATUS
PE-3D014 CAJAMARCA P.W.	CAJAMARCA	WATER SPRING	COMMUNITY FAUCETS HOME CONNECTIONS	COMPLETE
PE-4D004 TANAMAYO P.W.	PUNO	WATER SPRING	HOME CONNECTIONS	COMPLETE
PE-4D013 CHOSICA FEASIBILITY STUDY	LIMA	ATER WELLS	HOME CONNECTIONS	COMPLETE
PE-4D014 EL PLANETA WELLING DIGGING & P.W.	LIMA	WATER WELL	HOME CONNECTIONS	ON HOLD
PE-4D015 AURPAMES P.W.	CUSCO	WATER SPRINGS	COMMUNITY FAUCETS	ACTIVE
PE-4D024 CHUMBIBILCAS P.W.	CUSCO	WATER SPRINGS	COMMUNITY FAUCETS	ACTIVE
PE-5D006 HUAJJE P.W.	PUNO	WATER SPRINGS	COMMUNITY FAUCETS	COMPLETE
PE-5D015 BELLAVISTA P.W.	PIURA	MAIN CITY P.W. SYSTEM	COMMUNITY FAUCETS HOME CONNECTIONS	COMPLETE
PE-5D016 CHOSICA P.W.	LIMA	---	---	CANCELED
PE-5D017 CATACAOS P.W. STUDY	PIURA	WATER WELL	COMMUNITY FAUCETS	COMPLETE
PE-5D024 CUMBEMAYO P.W.	CAJAMARCA	RIVER	COMMUNITY FAUCETS	ACTIVE
PE-6D008 SICUANI P.W.	CUSCO	WATER SPRINGS IRRIGATION CANALS	COMMUNITY FAUCETS	ACTIVE
E-6D011 I. ESCUDERO P.W.	PIURA	MAIN CITY P.W. SYSTEM	COMMUNITY FAUCETS	ACTIVE
PE-6D016 CAJAMARCA P.W.	CAJAMARCA	WATER SPRING	COMMUNITY FAUCETS HOME CONNECTIONS	ACTIVE

Table 3

CHUMBIBILCAS PROJECT FUNDING ANALYSIS

		Itemized Budget for CRS Requested Amount	
Total Value of Project	$11,244		
Funding to date		Personnel	$ 424
--Outside resources		Equipment	849
--Local funds		Materials	8,866
--Non-government in-kind support	1,105		
TOTAL request CRS	$10,139		

Source: CRS-Peru

Table 4

IGNACIO ESCUDERO PROJECT FUNDING ANALYSIS

Total Project Cost	$359,174
Total Requested of CRS	$137,813
Itemized Budget/CRS	
Personnel	$ 11,880
Training Materials	7,500
Construction Materials	105,905
Administration	12,528
TOTAL	$137,813

Source: CRS - Peru

Table 5

BELLAVISTA PROJECT FUNDING ANALYSIS

FUNDING HISTORY

Total Value	As Proposed	$65,899	Currently	$65,899
Total Requested of CRS	As Proposed	$47,200	Revised	$47,200

CRS FUNDING RECORD TO DATE
(Use prefix "D" for Decommitment; "T" for Transfer)

Donor	Commitment No.	Fund	Date	Amount	Dollars Expended	Dollars Balance
CRS\AID Matching Grant	11	571	07/09/85	40,120	40,120	-0-
CRS/AID Matching Grant		571	11/07/85	(T*) 7,080	7,080	-0-
TOTALS					47,200	-0-

*Transfer from PE-5D016

DIRECT GRANT/DONATIONS TO CRS PROGRAM OFFICE IN-COUNTRY
($EQUIVALENT ONLY)

Source	Date	Amount
N.A.		

FINANCIAL ACTIVITY
(THIS REPORTING PERIOD ONLY)

Cash Flow	US Dollars CRS Account	Local Currency CRS Account	Project Holder's Account
Opening Balance	-0-	-0-	-0-
Received (Itemize)	47,200.00	788,900.80	788,864.50 *
Available This Period	47,200.00	788,900.80	788,864.50
Expenditure (Itemize)	47,200.00	788,900.80	788,864.50
Closing Balance (To Be Carried Forward)	-0-	-0-	-0-

*Bank Charges: I/.36.30

Table 6

BELLAVISTA PROJECT BUDGET ITEMIZATION

Item	Requested to CRS S/. x 1,000	Requested to CRS $$	Local Support $$	Total Value $$
Personnel	52,200	6,248	--	6,248
Construction Materials	293,101	35,081	--	35,081
Educational Materials	13,200	1,580	--	1,580
Manpower	--	--	8,502	8,502
Social Promotion Activities	--	--	718	718
Home Connections - Admin. Expenses	35,850	4,291	--	4,291
TOTALS	394,351	47,200	18,699	65,899

Source: CRS - Peru

ANNEX 2

Forms Used by CRS
During Community Selection

CRS - Peru

FORMAT FOR PROJECT SELECTION

I. Basic/Information necessary for projects

(1) Name of project holder ______________________________

(2) Title of project ______________________________

____

(3) Location ______________________________

(4) Total Budget ______________________________

amount requested CRS ______________________________

(5) Problem to be addressed ______________________________

____

(6) Objectives

a) Long term

b) Short term (1 year)

(7) Plan of activities to meet objectives

(8) Institutional Capacity

II. Social Indicators

Strenghts of the project

Weaknesses of the project

General Conclusions and Decision

Decision in staff and action to be taken

TABLE 3

AUSPICIA
MINISTERIO DE SALUD
AREA DE SALUD - SULLANA
INSTITUTO DE DESARROLLO COMUNAL (IDECO-VICUS)
CONCEJO DISTRITAL - IGNACIO ESCUDERO
EJECUTA
"COMITE DE AUTOGESTION COMUNAL"
IGNACIO ESCUDERO - SULLANA

FICHA DE ENCUESTA GENERAL DEL DISTRITO DE IGNACIO ESCUDERO SULLANA

DATOS DEL ENCUESTADO
010 - UBICACION   011 - LOTE
012 - CASERIO
100 - IDENTIDAD DEL ENCUESTADO
110 - APELLIDOS
111 - NOMBRES
112 - EDAD
113 - L.E.

ESTADO CIVIL	130 ACTIVIDAD	140 OCUPACION
SOLTERO	131 AGRICULTOR	141 OBRERO
CASADO	132 COMERCIO	142 EMPLEADO
VIUDO	133 CONSTRUCTOR	143 INDEPENDIENTE
DIVORCIADO	134 ARTESANO	144 AGRICULTOR
CONVIVIENTE	135 SERVICIOS	145 EVENTUAL
NOMBRE-APELLIDOS DEL CONYUGUE		146 SIN EMPLEO

150 ES SOCIO DE LA COOP.
151 SI   152 NO

CARGO QUE DESEMPEÑA :

154 INGRESO MENSUAL
155 MENOS DE 700
156 700
157 MAS DE 700

GRADO DE INSTRUCCION	170 OCUPACION DEL CONYUGUE	180 INGRESO PROMEDIO DEL CONYUGUE
31 ANALFABETO	171 SU CASA	
32 PRIMARIA	172 VIVANDERA	181 MENOS DE 700
33 SECUNDARIA	173 CRIANZA DE AVES	182 700
154 TECNICA	174 BODEGERA	183 MAS DE 700

200 ATENCION EN SALUD

210 EN EMBARAZO SE CONTROLA	220 EN ENFERMEDAD SE ATIENDE	230 METODOS DE PLANIFICACION FAMILIAR
211 P.M. CASERIO	221 P.M. CASERIO	231 PASTILLAS
212 P.M. IGNACIO ESCUDERO	222 P.M. IGNACIO ESCUDERO	232 ESPIRAL
213 H. DE SULLANA	223 H. DE SULLANA	233 PRESERVATIVO
214 MEDICO PARTICULAR	224 MEDICO PARTICULAR	234 MESTRUACION
215 PARTERA	225 CURANDERO	235 OTROS
216 NO SE CONTROLA	226 SE AUTORECETA	

240 NACIMIENTOS DE PARTOS	250 EN EL CONSUMO DEL AGUA LA HIERVE	260 TRATAMIENTO MEDICO
		261 FARMACIA
241 VIVOS	251 NO	262 HIERVAS
242 MUERTOS	252 SI	263 OTROS
	253 NO SIEMPRE	

500 POLITICA ALIMENTICIA

510 TIENE CONOCIMIENTO NUTRICIONAL EN		
511	PROTEINAS	☐
512	CARBOHIDRATOS	☐
513	VITAMINAS	☐
514	CALORIAS	☐
515	NO CONOCE	☐

520 DESAYUNO		
521	CAFE	☐
522	TE	☐
523	QUAQUER	☐
524	MATE	☐
525	LECHE	☐
526	PAN	☐
527	YUCA	☐
528	NO TOMA	☐

530 ALMUERZO SOPA		
531	FIDEOS	☐
532	CARNE	☐
533	VERDURAS	☐
534	PESCADO	☐
535	AGUADITO	☐
	ARROZ CON	
536	MENESTRAS	☐
537	FIDEOS	☐
538	GUISOS	☐
539	OTROS	☐

540 MERIENDA ARROZ CON		
541	PESCADO	☐
542	POLLO	☐
543	MENESTRAS	☐
544	HABAS	☐
545	CARNE	☐

550 FRUTAS		
551	MANZANAS	☐
552	PERA	☐
553	HUABAS	☐
554	TAMARINDO	☐
555	SANDIA	☐
556	NARANJA	☐

560 LECHE QUE CONSUME		
561	VACA	☐
562	CABRA	☐
563	ENCI	☐
564	GLORIA	☐
565	SOYA	☐
566	NO CONSUME	☐

400 [illegible] DE LA VIVIENDA

NOMBRE	EDAD M	EDAD F	PARENTESCO	EDUCACION	OCUPACION	INGRESO

410 POSEE SERVICIOS HIGIENICOS		
411	SILO	☐
412	LETRINA	☐
413	NO TIENE	☐

420 SE ALUMBRA CON		
421	MECHON	☐
422	LAMPARA	☐
423	FOCO_BAT	☐
424	PETROMAS	☐
425	VELA	☐

500 POLITICA PRODUCTIVA Y COMERCIAL

510 POSEE CHACRA		
511	SI	☐
512	NO	☐
513	DIMENSION	MTS

520 TRABAJA CON		
521	ESPOSA	☐
522	HIJOS	☐
523	PEONES	☐
524	SOLO	☐

530 LA SIEMBRA ES		
531	ARADO_BESTIA	☐
532	TRACTOR	☐
533	SIN ARADO	☐
534	OTROS	☐

540 PRODUCE		
541	ALGODON	☐
542	MAIZ	☐
543	ARROZ	☐
544	FRUTAS	☐
545	VERDURAS	☐

550 FINANCIAMIENTO		
551	BCO. AGRARIO	☐
552	OTROS BANCOS	☐
553	PRESTAMO PARTICULAR	☐
554	RECURSOS PROPIOS	☐
555	OTROS	☐

560 ALIMENTOS_COMPRA		
561	PULPERIA_CASERIO	☐
562	MERCADO IGNACIO ESCUDERO	☐
563	SULLANA	☐
564	FUERA DE SULLANA	☐

600 PARTICIPA EN

610	INSTITUCIONES RELIGIOSAS	☐
611	" DEPORTIVAS	☐
612	" CULTURALES	☐
620	COMITE_AGUA	☐
621	COMITE_SALUD	☐
622	COMITE_ELECTRICIDAD	☐
623	COMITE_DESARROLLO	☐
624	COMITE_MADRES	☐
625	NO PARTICIPA	☐

ANNEX 3

Photographs

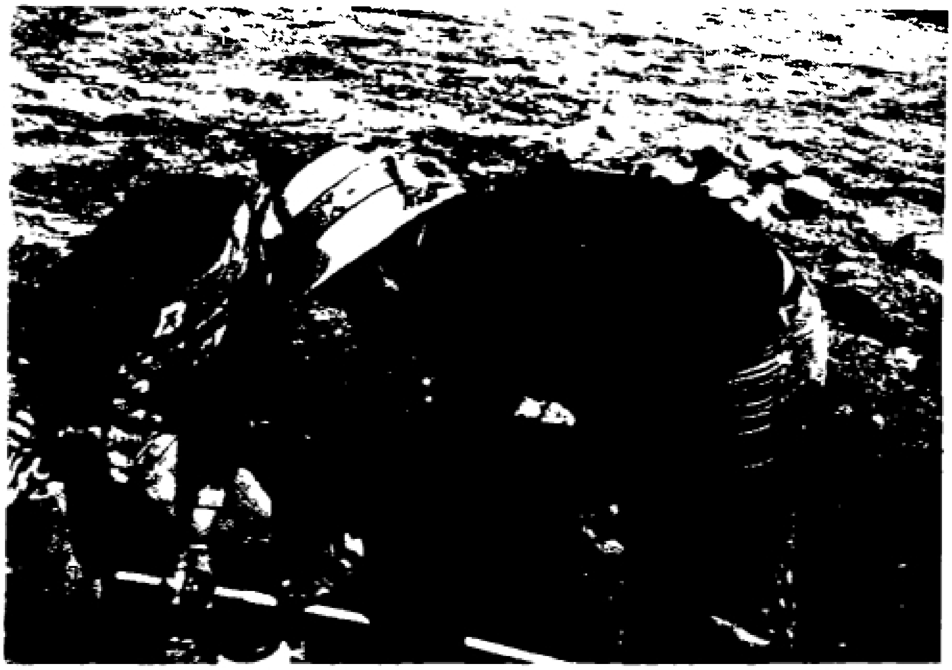

Photo 1. Pipe installation by community at Chumbivilcas area (Cuzco).

Photo 2. Public water tap typical of systems at Chumbivilcas area.

Photo 3. Community member ready to install his water connection inside his house. Piura area, Bellavista Village.

Photo 4. Typical water tap inside the house - Piura Region.

Photo 5. Storage tank built by community at Chumbivilcas Area - Cuzco Province.

Phote 6. "Family garden" grown at Bellavista Village home using new water system.

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Key Individuals Contacted

KEY INDIVIDUALS CONTACTED

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Ms. Coletta Youngers	CRS Officer in Peru
Mr. Wally Blake	Project Manager, CRS Office in Peru
Mr. Armando Zapata	Director, IDECO/VICUS (Project Holder)
Mr. Jorge Rivera	IDECO/VICUS, CRS Project Coordinator
Mr. Rafael Lama	IDECO/VICUS, CRS Project Coordinator
Mr. Juan More	IDECO/VICUS, CRS Project Coordinator
Ms. Silvia Cancamo	IDECO/VICUS, CRS Project Health Educator
Mr. Santos Reto Heira	Bellavista Major
Ms. Judith Lenihan	IAC/CRS Project Holder, Chumbibilcas area
Mr. Carlos Dolmos	IAC/CRS Project Holder Officer
Mr. Alfredo Cabrera	Chumbibilcas IAC Project Engineer
Mr. Hernan Cucko	Chief, Chumbibilcas Region

APPENDIX C

FIELD REPORT ON EVALUATION OF CRS PROJECTS IN GUATEMALA

by

Richard Duncan
and
Homero Silva

APPENDIX C

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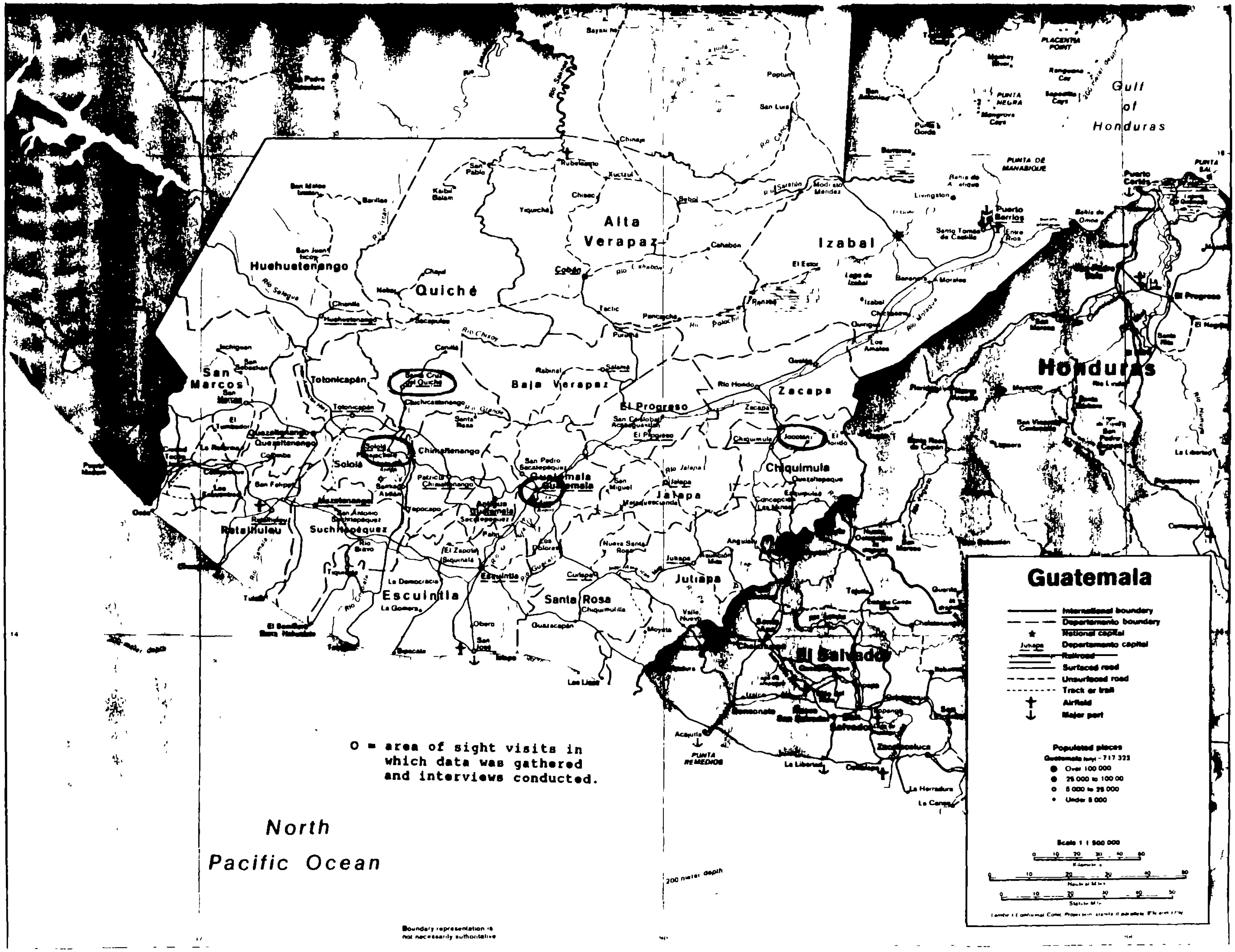
MAP OF GUATEMALA



O = area of sight visits in which data was gathered and interviews conducted.

ACKNOWLEDGMENTS

The Catholic Relief Services (CRS) field office and the project holders Agua del Pueblo and Spokane Diocesan Mission, contributed to the speed and economy with which the field work was carried out.

It was most fortunate that the CRS field office in Guatemala is staffed by professionals familiar with the Agency for International Development, with national agencies, and other private voluntary organizations (PVOs) operating in the country and in a position to lend vital assistance. The field team received invaluable support from the CRS Representative, Mr. Dan Moriarty.

Special credit is due to Dr. Jose Miguel Vasquez and Enrique Vasquez from SDM, and Carlos Gomez and Ing. Emilio Falla from Agua del Pueblo. They were instrumental in making preliminary contact with communities visited, and were invaluable as active participants in the evaluation themselves. The respect and affection with which they were greeted at one after another of the communities contributed greatly to the good reception enjoyed by the evaluation team.

We would be remiss if we were to overlook the encouragement received from the New York office of CRS. Mr. Ray Victurine made possible the active participation of the CRS personnel.

The USAID Mission provided valuable assistance during the briefing and debriefing meetings. We express our gratitude to Tom Kellermann, Programming Officer, Victor Dardon, Chief Regional Engineer, and Roberto Perdomo, Chief Engineering Officer.

Many other individuals contributed to this effort. There is not enough space to list them all.

LIST OF ACRONYMS

ADP	Agua del Pueblo
ASECSA	Associación de Educación Comunitaria Sociedad Anonima (Association of Community Services for Health)
ASTM	American Society for Testing and Materials
Lpcd	liters per capita per day
LDC	Less Developed Country
PVO	Private Voluntary Organization
SDM	Spokane Diocesan Mission
TAR	Technician in Rural Aqueducts

Chapter 1

INTRODUCTION

During the three-year period of the grant, CRS-Guatemala has worked with two local groups to implement this program: Agua del Pueblo (ADP), a Guatemalan private voluntary organization, and Spokane Diocesan Mission Program (SDM) in Solola.

ADP has completed six community projects, is finishing one now, and will carry out three more in the next six months. The projects will provide potable water and latrine services to 2,439 families, primarily in isolated communities in Huehuetenango, Chiquimula, and El Quiche. The SDM program has completed 11 community projects and is currently implementing two more. These projects will provide potable water and latrine services to 1,104 families in the department of Solola. For the two programs (with ADP and SDM) the total project cost is $849,145. The AID/CRS contribution to the projects is $586,862.

The purpose of the WASH team visit, by Dr. Richard Duncan and Dr. Homero Silva, was to evaluate and assess the three-year water and sanitation program. They arrived in Guatemala October 17 and departed October 28, 1986. Upon arrival, the WASH team held meetings with CRS representatives, USAID Water and Sanitation and Health staff, and with Agua del Pueblo staff. In these meetings, a briefing and a document review were carried out.

Material was also reviewed from USAID, CRS, and Agua del Pueblo to gather information and determine plans for field work. With the very limited time available, visits to remote but important projects of ADP in Huehuetenango had to be eliminated.

It was possible to visit only four villages of the program carried out by the SDM: Panimaja, Chucuilil, Chuquix, and Xoljuyub. However, these villages appear to be representative. Two ADP villages were visited: Ticanlu and Xatinap. After preliminary discussions, the evaluation team determined that the most practical approach to field work was as follows:

- Interview project holders and select villages to be visited
- Interview local water committee maintenance men and other responsible officials.
- Interview local health promoters
- Interview a selection of users (in their household if possible)
- Observe the water system (tanks, piping, water intake, and taps) and the conditions in the community.

After the site visits, debriefings were held with SDM, ADP, CRS, and USAID staffs. A draft report with conclusions and recommendations, framed in a provisional context designed for action oriented decisions and future planning was left with CRS and USAID staff.

Chapter 2

PROJECT DEVELOPMENT

2.1 Introduction

The Guatemala National Plan for the International Drinking Water Supply and Sanitation Decade indicates that in spite of Government and private efforts, more than 75 percent of the rural population of Guatemala is without adequate potable water, while infectious and intestinal diseases -- many water related -- are the major cause of rural deaths.

In the implementation of this grant during the past three years CRS-Guatemala has worked with two local groups to implement a total of 23 projects under this program: for projects with Agua del Pueblo (ADP), a Guatemalan private voluntary organization, total CRS/AID contribution will amount to $475,404. Local communities are contributing funds, labor, and raw materials. For projects of the Spokane Diocesan Mission Program (SDM) in Solola, total CRS/AID contribution will amount to $69,774. The local communities are contributing labor and raw materials under the direction of a local medical doctor and a technician. Provisions have been made for post-installation maintenance and health programs. The project-by-project costs are contained in Annex 1.

2.2 Program Approach

Given its small staff and the lack of institutions capable of implementing water projects which meet the program criteria envisioned under the grant, CRS-Guatemala delegated major responsibility for project development and implementation to project holders. The local CRS office reviewed and recommended each project and CRS-New York approved them individually. However, the review was limited to basic criteria and approval was expeditious. Once approved, CRS-Guatemala then turned over the funds to the project holder and required a report at the termination of each project.

A CRS representative visits project areas regularly and maintains an informal relationship with the project holder in order to monitor the process. Project holders provide regular reports of their activities. In addition, SDM conducted a study of different communities to test some hypotheses about factors affecting project accomplishment. ADP has a reporting procedure and is beginning a monitoring and evaluation process.

The approaches of each of the different project holders provide an excellent contrast. Time and geography limited the number of projects which could be visited, but a reasonably representative sample of projects were seen. Reports on the other projects were studied.

2.2.1 SDM Approach

SDM depends on a network of church-related communication, including those communities with which the Diocese Clinic is already working.

Once the community requests assistance, it is visited by the doctor from the Clinic to determine if the community meets the criteria of the program. If so, the project is prepared and submitted to CRS-Guatemala.

After approval has been granted by CRS-New York and funds made available, the community water committee oversees the provision of local materials and works with the technician to construct the system. In addition, two to four persons are designated to maintain the system and make repairs. At the same time, a health promoter is named by the community who will have the responsibility for sanitation and health education in the community.

Follow-up on the technical problems rests with the maintenance men who may contact the SDM technician. The water committee frequently becomes (or reverts to) the improvement committee and continues to collect funds for maintenance.

2.2.2 ADP Approach

ADP has a more elaborate process of project development and implementation, but essentially responds to requests and applies CRS policy to community selection.

CRS designates certain low-income areas. Communities in those areas whose committees take the initiative to contact ADP are the ones which normally obtain the feasibility studies.

ADP then submits a technical plan which includes an integrated program for technical training, organizational development, and health education.

After approval, a Technician in Rural Aqueducts (TAR) supervises all aspects of the project. He is the general advisor, technician, educator, promoter, and expediter who works with the local water committee to see that construction is undertaken properly and that the other elements of the project are completed. He is supervised by an engineer.

Chapter 3

COMMUNITY SELECTION AND PARTICIPATION

3.1 Criteria for Selection

CRS and SDM have separate but complementary selection criteria. ADP does not have selection criteria for the program -- ADP does feasibility studies on those communities that are recommended to them by CRS. CRS criteria are as follows:

1. The community is located in Solola or Quiche,
2. The community is isolated, and
3. A local health promoter person is available.

In general the community selection criteria are well applied and clearly defined. Communities visited met the health promoter requirement. However, some communities did not meet some requirements. For example, one of the communities visited, Ticanlu, does not meet the location criteria; and Xatinap, as well as other communities mentioned later do not meet the isolation requirement. CRS does not have a cost limit in its selection criteria, which is a serious shortcoming of the program. It is possible that available funds might reach more beneficiaries if a cost limit had been established at the start of the program. SDM criteria are as follows:

1. The community is isolated,
2. There is no existing water service,
3. There is a low income level, and
4. Providing water can be done at low cost.

SDM's criteria are similar to CRS's. The criteria are in general followed, except for some deviations found. Xoljuyub and Chucuilil do not meet all of the criteria.

Distance to the water supply source in combination with community size is a criteria used by SDM. If the community is small, fewer than 15 families (around 105 persons), and the distance to the water source is more than 10 kms, water is not provided.

3.2 Size of Communities Selected

No limit on population size has been established for either project holder. Communities chosen are small, poor, and underserved. Community size varied from 246 to 6,000, averaging 1,295. An alternative policy would require investment in larger-size communities, so that a larger number of equally needy people could be benefited. However, the team observed that larger communities have a better chance to receive government aid. Hence, funds available from this grant are being well applied.

3.3 Levels of Service and Community Coverage

Levels of Service

CRS does not have a policy on minimum level of service nor does SDM. However, patio connection service is the most frequent level of service provided to the communities by SDM. On the contrary, ADP guidelines require patio connections as the minimum allowed level of service. ADP officials have expressed their belief that standpipes are a complete failure in Guatemala. They argue that people do not take care of the standpipe and that the collection of fees is almost impossible (the experience in the Dominican Republic shows the opposite, that is, a well-organized community is able to maintain a standpipe without any problem). Team members did observe that water wastage (faucets continuously running water) is a problem in communities with poor education on water conservation.

There is, of course, a whole range of possible levels of service. Financial considerations (i.e., willingness and ability to pay) should be a principal factor in creating levels of service. The level of service suitable for a community depends on different factors. The levels of service available to a given community are generally defined in terms of distance to the water distribution point, i.e., standpipes, patio connections, and house connections.

In addition, the level of service may also be defined by whether the system operates continuously or intermittently. The intermittent level of service (where water is not provided all of the time), may permit distribution system designs to meet either the average day or the maximum day demand, but not the peak hour demand. This level of service will permit some savings in money because the diameter of the piping is smaller. The continuous level of service is the one that has adequate water resources and is designed to meet the peak hour demand. There are many water distribution systems in less developed countries (LDCs) that work intermittently. It should be noted, however, that many countries do not permit systems to be designed to operate intermittently -- there are potential dangers to health and the system may be damaged from constant filling operations.

Community Coverage

CRS and ADP guidelines both require 80 percent community coverage as a minimum. Hence, 80 percent of the community must sign an agreement before the community is considered for a water and sanitation project. In addition, ADP

households are required to make an initial down-payment which varies from Q30.0 to Q50.0 (U.S. $11.10 to $18.50). This down-payment is to be paid during the construction period. The down-payment covers repayment of the loan that is given to the community. The community also supports the project through labor and local materials.

SDM also has a minimum community coverage of 80 percent, but they do not require a signed agreement nor ask for a down-payment. In this case the community only supplies materials and labor.

In those communities visited, water and sanitation projects cover more than 80 percent of the population. There are a few instances where water is not provided because the water source is lower than the house. In none of the communities visited did people express dissatisfaction with the coverage. Most likely, this is so because during the planning process all of the community has the opportunity to decide whether they want to benefit from the water and sanitation program or not.

Neither information nor time was available for a detailed analysis of the projects to determine if optimum use of money was made to provide the maximum coverage possible. Service coverage should be selected on the basis of the location of houses, density, the cost of developing the source, and the cost of each increment of the distribution system.

3.4 Community Organization and Participation

3.4.1 Organizational Factors

For many years Guatemalan communities have established community improvement committees to work with the various government agencies promoting rural or community development. All of the communities visited had such committees. Some had been active in building schools, community centers, etc., and others had been only formal structures. Under the grant program, project holders require a community to have an organization to coordinate and take responsibility for the water supply and sanitation project. As a result, communities either set up special water committees or the existing committees become a water committee in order to qualify for assistance.

The CRS requirement that a community have a water committee is strictly adhered to by both project holders (ADP and SDM). Well-organized communities are more likely to receive assistance. This is especially true of the ADP program except in cases where church agencies are involved. The team was unable to visit the project in Huehuetenango in which the Maryknoll sisters are working closely with ADP to select communities with the most need.

The SDM program is more likely to encourage communities with poor organization to apply. However, SDM is not as well equipped as ADP to provide assistance in organizational development. Nevertheless, some poorly organized communities seem to have made important initial strides in projects supported by both organizations.

Once the other requirements were fulfilled and the project approved, the need to organize for construction of the system imposed a practical organization on the community. ADP took advantage of this process to carry out a program of organizational development, using lectures, personal efforts of the TAR, and occasionally group dynamics techniques.

SDM had no such program. However, the regular visits of a technician or doctor tended to bring about an informal and slow, but continuous process of organizational development. Moreover, this process continued after the water project was complete because of the continuing presence of medical personnel and the availability of a technician.

All projects promoted organization, health education, and increased participation. The WASH consultants attempted to assess the community situation prior to the project, estimate the level of intervention, and measure some changes reflected in the present situation.

Table C-1 was devised to focus diverse elements in order to assess organization, health education, and participation. They are rated on a scale of 0 to 3. The ratings were based on a few verifiable facts, observations, conversations, and experienced but subjective judgments. The confirmation of some elements and information from previous studies, as well as the obvious intuitive relationships, provided a substantial base for judgments about organizational development.

Table C-1 does not account for the fact that moving from 0 to 1 on the organizational scale is a much larger achievement than moving from 2 to 3. Further, three of the communities which moved from low to moderate organizational capacity had little conscious training and support.

In the case of SDM, organization development is informal and based on immediate problem solving. In the case of Agua del Pueblo, the carefully developed plans are often erratically implemented. Therefore, the level of intervention indicators on the chart does not always result in progress.

In one ADP project, little organization, support resulted in modest but significant organization growth (Ticanlu). In another, it appears that immediate problems have been resolved but there is little prospect of continued growth (Xatinap).

The only cases in which there was not some organization growth were those in which there was already a significant capacity to organize. In those cases other benefits were observed.

3.4.2 Participation

The dimensions of participation have been explored at considerable length in many studies. For the purposes of this study, we will be concerned with (a) participation in planning; (b) implementation; and (c) benefits received. Another factor which crosscuts all of these is the cost of participation.

Both project holders required full participation in the decision to seek assistance for a water system. The requirement is that 80 precent of the community must agree or the project will not be undertaken.

In addition, the community must undertake some of the costs of planning. In the SDM cases, they must pay for the topographic and technical studies. ADP requires an initial down-payment on the loan it makes to the community. The remainder of the loan, which varies with the capacity of the community, is paid in five payments over a six-year period.

The planning of an SDM project is in the hands of a single technician. ADP staff not only plan the technical aspects but also the organizational and educational components, often after a survey which they conduct in the community.

The entire community participates in the construction of the system. Widows or disabled persons either hire someone to do their part, make such contributions as they can, or are included through a grant or some determination by the community.

In the projects visited, only one case was found of problems about participation. This was a case in which two community committees with different populations were involved in a single project with the percentage of the project labor force to be provided by each group. The problem was solved through negotiation, with the assistance of the TAR.

Some communities do not collect funds in advance for maintenance. Community members stated that the tradition of collecting money when necessary was strong, and no lack of funds for repairs would be likely.

Since patio connections were the general rule, everybody participated equally in the benefits of the project with almost no exceptions. Successful projects appear to show that greater participation was engendered by the project. The degree of participation was difficult to estimate both before and after the project. In some cases, new organizations incorporating more people was an indicator. With other projects, village promoters and villagers themselves discussed the confidence that the project had provided to the community and the resultant increased participation.

Two communities with relatively high levels of education did not appear to have increased participation. In other cases, even though a special promoter had been trained and more people were receiving health education, there was little evidence of more active participation in community affairs.

In cases where organizational development had taken place, more people were participating in community activities, and new activities or interest groups indicated more participation. Interviews indicate that the confidence and the gratification that comes with achievement will tend to increase participation. Another important indicator is the degree to which initial leadership in the community has incorporated others into the leadership group of the community.

Participation was also limited by literacy. In highly illiterate communities officers of any organization, out of necessity, had to be literate. Other members of the community were often active and supportive; the community itself recognized the limitations and only elected literate people to key positions.

One community used all of its spare parts for the water system to build and supply water to a maize grinding mill for the community. Others, which had involved schoolteachers, were holding health education and other classes with participation by women and children and occasionally men.

In most projects women's interest in water promoted greater participation in both the activities supporting construction and subsequent activities in education and health. In cases in which organizational and health education activities were progressing well, women appear to be more active. Some women stated that they had more time to participate in community activities. Others were committed to promoting water and health through community work.

Table C-1

APPROXIMATE CLASSIFICATION OF KEY VARIABLES RELATED TO THE CRS WATER PROJECTS IN DIFFERENT VILLAGES

GUATEMALA

	BEFORE			INTERVENTION			AFTER					
	Prev. Org.	Awar. &Educ.	Part.	Trg.	Effort.	Supp.	Org.	Chge.	Awar. &Educ.	Chge.	Part.	Chge.
Panimaja	1	0	1	2	2	3	2	+1	1	+1	1	0
Chulilla	3	2	2	3	2	3	3	0	3	+1	2	0
Chequix	0	0	1	2	3	2	1	+1	1	+1	2	+1
Xoluyub	2	2	1	0	1	2	2	0	2	0	1	0
Xatinap	1	1	1	3	2	2	2	+1	1	0	2	+1
Ticanlu	1	0	1	1	2	1	2	+1	1	+1	2	+1

NOTES:

"BEFORE Variables" are estimates obtained from interviews and other sources on the level of previous organizational capacity; the degree of previous awareness of sanitation needs and level of health education; and the degree of community participation which existed prior to the initiation of the project.

"INTERVENTION Variables" are estimates obtained from reports and interviews on the amount of training provided, the level of effort in the community and the support from all outside agencies during execution of the project.

"AFTER Variables" are estimates based on observations and interviews on the present state of organizational capacity, awareness of sanitation needs, level of health education, and the degree of community participation which now exists in the community. A separate column records the change in each factor for each community. See methodological notes for the individual indicators used for each variable.

METHODOLOGICAL NOTES FOR TABLE C-1

The general guidance in classifying the reports, interviews, and observations on each village visited is as follows:

COMMUNITY VARIABLES

Organization

0 = community organization exists in name only
1 = organization accepted by the community with few or no accomplishments
2 = functioning organization with some accomplishments (schools built, etc.)
3 = multiple organizations or very active organization dealing with diverse community problems

Awareness and Education

0 = extremely limited awareness of health and sanitation practices
1 = awareness of sanitation needs, little knowledge of health - no observed practices
2 = high awareness, considerable health knowledge - little evidence of practices
3 = both extensive health knowledge and evidence of regular application to community conditions

Participation

0 = community dominated by one person or group, factionalism or general lack of interest by community
1 = strong leadership and passive participation by community
2 = strong or diffuse leadership with some active participation by significant portion of community
3 = diverse groups and leadership in multiple channels and high level of active participation

INTERVENTION VARIABLES

Training

0 = no training was accomplished during the project
1 = limited training (e.g., only in construction)
2 = community training on different aspects of the project (e.g., organization and health)
3 = comprehensive training in health organization and construction including course away from the village for certain members

Effort

0 = community made little or no effort to support the project
1 = community assisted in construction and little else
2 = community made significant effort to support the project
3 = community took independent initiative to support the project and made special effort toward project accomplishment (incorporated school, other community facilities, etc.)

Support

0 = neither project holder, community leadership, nor other participants gave significant support to the project
1 = limited efforts were made by project holder and others (to provide minimum support or deal with community problems)
2 = adequate support was provided in most aspects of the project
3 = consistent efforts were made to support community actions and attend to any project problems which arose

Chapter 4

SYSTEM DESIGN AND CONSTRUCTION

4.1 Criteria for Water and Sanitation Systems

Water and sanitation projects were evaluated by reviewing some major areas in the six communities visited. The major areas reviewed were as follows:

- source selection and measurement;
- source protection;
- design features, chlorination, breaktanks.

4.1.1 Source Selection and Measurement

Type of Source. All of the communities visited were using springs as their source of water supply. Both ADP and SDM prefer the construction of gravity-supply systems because they believe that a water project will be successful only if the community is able to maintain and operate it. ADP is working on one project which uses water from a river as a source; treatment is going to be applied by using a grit removal chamber, a settling tank, and slow filtration. Chlorination is not applied because the people do not like the taste of chlorinated water.

Water Quality. In general, the water supply source selected is of better quality than the traditional source of water. This was the general belief of the persons interviewed in the different communities visited. Water quality testing varies from project to project and from organization to organization. In general ADP conducts more testing than SDM. Water quality testing in the case of SDM is seldom conducted on water sources in all projects: physical-chemical tests were never conducted and bacteriological tests were conducted in only two projects. In the case of ADP, water quality checking is done during the design phases. However, it could be improved by more frequent sampling, not only during the design phase but during the operation phase as well.

Concern has been expressed by CRS and the project holder about the impossibility of conducting some water analyses. However, the evaluation team believes that equipment is available to conduct most of the analyses required. Field equipment is available on the market to measure pH, temperature, conductivity, turbidity. Test strips are available for semi-quantitative determinations. The test is performed by dipping the test zone of a strip in the water sample and comparing the results with a color scale. The strips are particularly useful for testing for nitrites, sulfates, iron, ammonia, copper, and hydrogen. Also available are color disc test kits for testing of chlorine, nitrate, ammonia, pH, iron, chromium, cyanide, and phosphate. The color disc kits can be used easily in the field and will give more accurate results than test strips but are more expensive to buy and operate.

During the evaluation, water was occasionally observed or reported to contain worms, fish, floating matter, or silt. This condition is likely to prevent its use. Bacteriological information from several water supply systems indicates that water delivered does not meet water quality standards; fortunately most communities still boil water.

Water Quantity. One of the major benefits of these water supply projects is that the distance between the community and the water tap has been tremendously reduced -- from as much as 3 km to 10 meters.

Of the six communities visited, only Chiquix has a water shortage problem. This occurs during the dry season, from April through June. During this period water from the source is used for drinking purposes, the rest of the water is obtained from the old water source. The community knew in advance that water shortage problems would appear during the dry season, but still they wanted to have the new source of water. In this case it is believed that some water is better than no water, especially because the traditional source is of poor quality.

Water flow measurement is conducted at different times. In the case of SDM the community measures the flow twice and the technician also measures twice -- once during the dry period and once during the rainy season. ADP measures the flow a total of five times during both the dry and the rainy season. The time-volume method is generally used.

4.1.2 Source Protection

All of the communities visited have their water supply source located well above and distant from the community. This might be considered good source protection since it minimizes the potential for contamination from human wastes. However, nothing is being done to control the use of the watershed for raising livestock. Hence, animal defecation may be a potential source of pollution because, of all the water intake structures visited, only one of them was fenced, and groundwater may be too shallow, not allowing for enough time for self-purification.

Intake structure location is adequate, and no potential for seasonal flooding and contamination of the intake exists. Drainage ditches upstream of the intake were provided to intercept and divert surface runoff.

4.1.3 Design Criteria

The design approach of SDM lacks some important elements. SDM does not presently follow any design standards or apply formulas in the design. Experience and creativity are the main tools used in the design of water systems. Agua del Pueblo has its own set of essentially national design standards, with a few modifications. However, design standards could still be improved.

Suggested design parameters:

- Source Requirement. In the case of SDM, the source is required to provide 80 lpcd. If it is inadequate, the water project is not constructed. However, if the need for water is critical, that is, the existing water source is polluted, then the source is still developed. There is an instance where the water supply source can only supply 40 lpcd or less.

  In the case of ADP, the source should be able to meet the peak day water demand - based on the per capita amounts below. In the event that the source capacity is inadequate, an additional source is searched for. It is ADP's belief that if people are willing to pay for their water then they deserve to have an adequate amount of water.

- Per Capita Consumption. SDM attempts to provide 80 lcd. ADP provides from 60 to 90 lpcd, depending on the capacity of the water supply source and the cost. In both cases, recommended water consumption factors do not take into account the climate and socio-economic level of development. It is well known that a person living in a cold climate uses less water than a person living in a hot climate. Level of socio-economic development has also been shown to have an effect on the amount of water consumed.

- Population Projections. Water systems are designed for a future population. The design period recommended in the National Design is 20 years. A population census is conducted during the initial visit to the community. This information in conjunction with the growth rate is used to estimate the design population.

Growth rates are estimated from the last two community censuses. The geometric method is used for the population projection.

- Design Period. The design period may be too long. By using a 20-year design period, the system is being designed to supply water to a non-existent population, which amounts to about 60 percent of the actual population. This increases the cost of a project and prevents other communities from the present benefits of a water supply system.

- Average Day Water Demand. This is estimated by multiplying the per capita consumption by the design population.

- Maximum Day Water Demand. ADP uses a maximum day factor of 1.3, the government recommends 1.2. ADP's experience with rural systems has led to the use of this value. The maximum day water demand is estimated by multiplying the average demand times the factor. This demand is used to determine the adequacy of the water source. This is also used to size the aqueduct. The team found that sizing of the aqueduct is based on the capacity of the water source, not on the maximum day demand. Present SDM design approach does not use any design factors: experience is the main tool used for the dimensioning of pipes.

- Peak Hour Water Demand. ADP uses a peak hour factor of 2.5. This factor is used to size the distribution system. The distribution systems used are the branch type, no looped systems were reported in any of the communities.

- Storage Requirements. ADP provides storage capacity of 30 percent of the average day water demand. SDM uses a different approach, where experience is the main design factor, and tank capacity depends on the population size. Typical sizes are as follows:

Population	**Tank Capacity (liters)**	**% Average Day**
300	1,800	7.5
500	3,200	8.0
1,000	7,200	9.0

The tank capacity seems inadequate. However, no complaints were made during interviews held with different community members.

- Hydraulic Design. Darcy-Weisbach and Hazen-Williams equations are used by ADP for the design of the transmission line and the distribution system. Pressure breaker chambers are used when static pressure gets above 100 meters. Water hammer is considered when water velocity is high. SDM does not use any equations for the hydraulic design.

- System Design. All of the water systems constructed with matching grant funds are gravity flow. They are of a very simple design and work by themselves without the need for an operator. Gate valves are the only control systems. Storage tanks have been designed to allow for water to be bypassed during maintenance. SDM design has been improving. First designs of the intake structure called for two valves at the intake structure and three on the pipe lines (including overflow). Later designs use only one valve, two pipes, and no valve boxes.

- Minimum Pressure. Minimum recommended pressure is 10 meters. In general, this pressure is met. However, in a few projects pressures of less than 1.0 meter were experienced where some houses were above the hydraulic gradeline which prevented them from enjoying a continuous water service.

- Appurtenances. Air relief valves are recommended for the high points. No complaints on air accumulation in pipelines were reported.

  Drain valves are recommended at low points in the transmission line to flush out the solids accumulated in the line. Some of the projects visited have these devices.

  Storage tanks were provided with bypass capabilities. Therefore, water service is not cut off when maintenance of the storage tank is being provided.

- Sanitation Systems. Guatemalan communities do not feel an urgent need for a sanitation system, as they do for a water project. That is the reason why SDM and ADP do not force communities to build latrines, instead they educate them on health aspects to the point where the communities themselves feel the need for a latrine program.

  Two types of latrines are used in Guatemala, the conventional and the compost. SDM fabricates its own latrines, of the conventional type. Members of the community are selected and trained to construct the concrete slab and the toilet. Once trained they manufacture eight to ten toilets per day. Latrines are installed at the same time as the water system.

Depth of the hole is 2.0 to 2.5 meters. Panamaja is the only community visited without a latrine program.

ADP uses both types of latrines. The conventional ones are obtained from the Health Department free of charge. ADP only pays for the transportation. Compost latrines are built on site; community members are trained to build them. Latrine construction starts before the water supply project.

Latrines seem to be well designed. Depth, capacity, and location are adequate. Effects on groundwater are impossible to predict because depth to groundwater and type of soils are unknown. There is little supervision of the sanitation program by either SDM or ADP. They only advise and demonstrate to the community how to prepare and install latrines.

4.2 Materials and Methods of Construction

Most of the materials used in the construction of water projects are purchased in Guatemala City. PVC pipe, fittings, and glue are manufactured in Guatemala, as is galvanized pipe. Cement is also a Guatemalan product. Sand, stone, and wood are provided by the community and are local materials. Bronze faucets and gate valves are imported from Japan because they are less expensive than similar items available in country. Slip-joint PVC pipe is used for diameters 4" and larger. Solvent-welded PVC pipe is used for smaller sizes.

Galvanized pipe is used for yard taps in most of the communities visited. ADP is experimenting with PVC pipe embedded in concrete, claiming that this method is less expensive. SDM is opposed to it because it is time consuming to install.

Methods of construction are adequate. Heavy construction equipment is not used, rather pick and shovel and a few tools such as pipe cutters and pipe wrenches are used. A mason, who is hired by ADP or SDM, builds the intake structure and the storage tank with the help of the community. The community does the trench and the installation of the pipeline. The project supervisor trains them in the installation of gate valves and faucets.

Chlorination of intakes, storage tanks, and distribution systems and pressure tests in pipelines prior to use of the system are not practiced. The team believes that many pipe joint problems and other difficulties would be detected and repaired by conducting these simple tests.

4.3 Management

In general, ADP and SDM have a strong management plan for the implementation of the water supply projects. The approaches are different but they obtain good results.

A typical ADP project involves one supervisor engineer, one TAR (Technician in Rural Aqueducts), and the health education team. The engineer is in charge of the technical aspects, the TAR is in charge of the social and health aspects, and the health education team produces all the material needed for its activities to reinforce the participation of the community in all of the project activities. A typical project lasts nine months. The engineer visits the project twice a month, the TAR spends most of the time in the community, and the education team visits the project once a month.

SDM projects involve the help of a medical doctor and a technician. The doctor is in charge of the health aspects; the technician, the design and construction aspects. A typical project lasts 2.5 months. The doctor visits communities once a month and the technician spends most of the time there.

Materials are acquired in Guatemala City and there is good coordination on the delivery of materials. Materials are shipped to the project site in a period of one to two weeks. During this time the water committee prepares the storage shed and space is provided for pipes and fittings. Wood boxes are constructed to store pipe fittings and valves. The TAR trains the person in charge of the storage shed to keep records of all material that goes in and out of the shed. During this time the TAR also shows the water system operators all the different fittings and valves used in the project.

4.4 Financing and Economic Aspects

Two different approaches are used here to finance water supply projects. While ADP requires the community to pay for part of the project, SDM assumes all the capital costs.

In the ADP approach the community pays for up to 33 percent of the total cost of the project which includes cost of labor, local materials, down-payment and cash. The down-payment is paid during the construction of the water project, it varies from Q30.0 to Q50.0 (U.S. $11.10 to $18.50). The community receives a loan to pay for their part of the cost. They pay this loan in a period of 6 years. The first payment is due the second year after the water project is completed.

In the SDM approach the community only provides labor and local materials.

An effective use of the financial resources available has been made. This can be seen when comparing CRS average per capita total cost for the water systems with published government cost figures, the former is $37.97 and the latter is $100.00.

Most of the communities visited pay for the operations and maintenance cost. Communities have set the water rates with the aid of ADP or SDM personnel (see Table C-2). Unfortunately, the O&M cost has been set without any knowledge of the expenditures involved in the O&M of a water system. The following water rates are paid in the communities visited.

Table C-2

COMMUNITY WATER RATES

Community Name	Cost/household Q./month)	Total Collected Monthly, Q.
Panamaja	0.25	8.75
Chulilla	0.25	11.60
Chiquix	0.10	3.90
Xoljuyup	0.25	14.25
Xatinap	0.50	433.00
Ticanlu	0.10	5.10

From those costs presented above, it is possible to make some interesting comments. For example, to replace or install 100 feet of 2" PVC pipe (250 psi), Chiquix will spend an amount equivalent to 26.8 months of collected water fees and Ticanlu will spend 20.5 months. Do the water rates seem adequate? The team believes that the water rates are not adequate. Moreover, the team believes that it is necessary that the existing water systems generate the revenue necessary for the O&M and future expansion costs. The team recommends against the ADP practice which requires that every three years money accumulated from water rates be divided among the community members. We believe that O&M costs during the first years of the project will be nil, but they will increase as the water system gets old; hence the community needs to be financially prepared for that.

Chapter 5

SYSTEM OPERATIONS AND MAINTENANCE

5.1 Introduction

The weakest part of any rural water supply program is the O&M phase -- for a number of reasons. First, an insufficient number of trained personnel exists, causing broken water system equipment to lie in disrepair soon after construction. More skilled and semi-skilled technicians who can carry out simple repair and maintenance work are required. The second problem is timing. Training should start during the construction period, so that water operators can see the water system being built and will be ready to operate it when construction is completed. In many cases at least one person must be retained on the job during the first year of operation.

5.2 Organizational Aspects

ADP and SDM use similar approaches for the organizational part of the water and sanitation project. The first requirement, before a community is selected for a water project, is that a water committee be elected. The community must elect each member of the water committee. The water committee will be in charge of the construction and later the operations and maintenance of the system. They also will collect fees and schedule community members for the maintenance of the facilities.

Community meetings are regularly held, first during planning, later during construction, and much later during the operation of the projects. During the last phase, monthly meetings are held. Community members are obligated to attend these meetings. In case of absence one must present in writing the reason(s) for not attending the meeting.

ADP has developed a set of regulations which each member of the community is obligated to meet. SDM on the contrary, does not have any standard requirements; however, communities visited seem to be well organized to carry out the tasks needed for the correct operation of the system.

The maintenance of the system is carried out by all the members of the community, sometimes with the help of the water operators. The operation and repairs are conducted by the operators. These operators are selected among the members of the community and usually number from two to four. The operators must be young, literate, and, if possible, members of the water committee. They are selected at the start of the project and trained during the construction.

The team found the operators to be knowledgeable on the operations and maintenance of the water system. In several instances they have already fixed broken pipes without any difficulty.

5.3 Operational Status

Limited operations and maintenance information is available from a system that has been in operation for a short period of time. Communities visited had been operating at the most for three years. One system was recently completed. Still the team learned some of the operational problems, especially those related to water quantity, water quality, system reliability, and logistics.

In Table C-3, the operational status of these communities, in regard to water quality and quantity, is presented.

From this table, it can be observed that water quality in some communities is marginal. Moreover, bacteriological information from several water supply systems indicate that water delivered does not meet water quality standards.

On the other hand, water systems are supplying adequate amounts of water. Only one community reported water shortage, but that was not an operational problem. As a result of water availability, water consumption has increased to the point that children are cleaner and have better hygienic living conditions.

System reliability is adequate when the system provides water to the consumer on a continuous basis. In rural systems, because of existing economic conditions, this requirement is not as stringent. However, a rural system must minimize the number of times the system is down due to repairs. Information on the frequency of repairs and the duration was obtained from each community visited and presented in Table C-4.

The community of Ticanlu has repaired the intake structure three times and the transmission line once. They do not have a storage tank, so every time that the intake structure is cleaned up the system is shut down. Storage tanks in the other communities have a bypass that is activated during the maintenance of the storage tank.

Communities visited usually have an adequate stock of materials for the operations and maintenance of the system. Several lengths of pipes for each size, type and material are left. Water faucets and some pipe fittings are also left. Gate valves, glue, and washers are not left.

Systems visited do not have a maintenance program for chlorination of water intakes, storage tanks, and distribution lines, nor for periodic flushing of lines. In several instances water faucets were observed with plastic wrapped to the outlet or with a piece of hose connected to it. People stated that it prevents splashing.

Latrine maintenance is usually taught by health educators. Use of ash, lime, or "Nixtamal" water is recommended to prevent odors. "Nixtamal" is a mixture of water and lime used for boiling corn to soften it before grinding, during the tortilla manufacturing process (tortilla is the central american bread). Toilet covers are also recommended to prevent proliferation of mosquitoes and flies.

Table C-3

OPERATIONAL STATUS OF SYSTEMS VISITED

Name of Community	Year Completed	Water Quality	Water Quantity
Panamaja	1983	good, silt	adequate
Chiquix	1984	good	adequate
Xoljuyup	Feb. 1985	good,*	insufficient
Chulilla	Nov. 1985	good,*	adequate
Xatinap	Nov. 1986	good, silt	adequate
Ticanlu	1984	good,**	adequate

*Earthworms were observed or reported.
**A fish was caught in a water faucet.

Table C-4

RELIABILITY OF SYSTEMS VISITED

Community	Frequency of Repairs	Time To Fix It
Panamaja	none	0
Chiquix	once	1 day
Chucuilil	none	0
Xoljuyup	none	0
Xatinap	once	1/2 day
Ticanlu	many	1/2 day

5.4 Constraints

Most of the water intakes are located far from communities and up in the mountains. Given this situation, maintenance may be impeded. However, all of the communities visited seemed to have taken good care of the water intakes. Heavy hatch covers were observed in the first design which required four men to lift them. Fortunately, later designs have light covers that can be lifted by one person. Therefore, periodic inspections will not be discouraged. (See Annex 2 for selected community photographs.)

Chapter 6

HUMAN RESOURCES DEVELOPMENT

6.1 Personnel Selection

CRS did not participate in the personnel selection carried out by project holders or the communities.

6.2. Training

The training programs of the two project holders are different but each contains the elements for adequate training appropriate to the projects.

6.2.1 SDM Program

SDM training was the least ambitious but effective because of its practical orientation and continuity. The process includes training of a maintenance man and construction training for the community, but very limited training in community organization.

The health promoter selected by the community (if one does not already exist) is given training in the community through regular monthly visits by the doctor. The promoter attends courses at ASECSA (Association of Community Services for Health), a private organization that provides regular training courses for health promoters. The course at ASECSA involves 14 weeks of attendance during four years and includes some supervised training in the field, as well as course work at the Chimaltenango Center. However, no mention was made by any promoter of supervision or follow-up by ASECSA. In addition, there are monthly follow-up meetings of all community promoters in the clinic health education program with the doctor at Nahuala. This is a continuing process that does not stop when the water system is finished.

The doctor determines from these meetings which of the communities he should visit to provide services and more intensive training. The doctor, the health promoter, and the community appear satisfied with the process.

6.2.2 ADP Approach

All training by ADP was carried out on the project site. ADP is, however, in the process of becoming a member of ASECSA and might want to participate in its health promoter training program of 14 weeks during a four year period.

ADP's design of its on-site training program for both organizational and health education is innovative and uses modern materials including excellent audiovisuals. The training uses good learning approaches and community participation. Posters, songs, and even socio-drama are among the tools which have been developed.

Observations and interviews indicate that organizational training is more effective than health education training. It is also clear that practical work in the community on health education is often delayed and not necessarily done according to the schedule or in the intensity that is planned.

Only a few people in each community could remember what subjects were dealt with, although a larger number had understanding of the importance of water and health, indicating that some progress had been made. After the completion of the project, there were few efforts by ADP to conduct or arrange for follow-up training.

Chapter 7

HEALTH, SANITATION, AND WATER USE EDUCATION

7.1 Community Health Education Approach

SDM and ADP have two different approaches to health education. The SDM approach emphasizes direct actions that specifically deal with problems as they arise: training of a health promoter through visits, and the use of ASECSA and monthly follow-up meetings with the SDM clinic doctor.

The ADP approach was necessarily short-term and included a carefully planned, intensive set of interventions during the water system construction using modern and innovative methods to generate a health consciousness and promote interest in proper sanitation and the acquisition of latrines.

Both approaches appear to have had mixed results. Most communities seem to understand the basic aspects of water use. Greater availability of water brought about basic improvements in sanitation in most villages. Children were clean, patios were clean, more bathing and handwashing were reported, and in villages classified as more successful, wastewater drainage was improved.

Materials for construction of latrines are provided by CRS for most projects. For some communities, however, materials for latrines were not provided and had to be requested from some other government or non-governmental program.

Latrines--and an understanding of their importance--were found only in communities which had a reasonably high level of education or long-term health education program. A frequent response to questioning about why households should have a latrine was that they were told that is what they should do. In many communities latrines were being used occasionally, if at all.

In a few communities, some people understood latrine importance and the leader or the health promoter was engaged in developing more understanding and acceptance. In one community the health promoter did not have a latrine.

In one community (Chucuilil) there appeared to be almost universal understanding of the importance of latrines. This community had a high level of education, four health promoters (one was president of the Village Improvement Committee), and a longstanding health education program supported by SDM. Training had been given on installation. Eighty latrines had been installed and the Village Committee had visited the other 30 people, encouraging and assisting them in obtaining and installing latrines.

This provided a clear idea of the requirements for effective change in health knowledge of a community, although some other communities had made significant progress in understanding health and sanitation because of the water projects.

Some communities had not yet been able to obtain latrines. Among those, some had the required awareness for use. However, most communities needed follow-up and continued health education.

7.2 Criteria Established

Both project holders had practical criteria for health education activities based on national standards and local conditions.

7.3 Coordination with Construction and Maintenance

In half of the communities, some health education had been started by organizations in the communities before the water project. However, with the incorporation of the promoter a more intensive health education program was undertaken.

SDM's process was continued after the project was completed, but ADP efforts were more concentrated during the construction period.

7.4 Materials and Methods Used

SDM had very few materials and most of its education was done by the promoter relaying information through talks (some during the visit of the doctor) and visiting houses. No posters or other material were observed although several promoters had a copy of Where There Is No Doctor by David Werner. In the ASECSA course many materials were used in the course work and books were available at a low cost. There was no evidence that any printed health material was made available to the community.

ADP has an education department with four professionals, one of whom is an artist. They prepare visual materials, songs, puzzles, group dynamics exercises and posters which are used for discussion only. These methods were used in some cases. However, the WASH consultants could find limited evidence that people remembered their use. The usual response was that talks had been given. These answers may have been distorted by time lapse, nervousness, or method of use. There is also a cultural tendency to get absorbed in the game without putting enough emphasis on the substance.

Nevertheless, the ADP health education activities appear to have laid the groundwork for an effective program in both the communities observed. The activities need to be followed up by the community leaders to take advantage of the available resources for health education and further training of the health promoters.

7.5 Funding Allocation

It is not possible to determine the amount of funds spent on training and education in the SDM project since it is integrated with the clinic. ASECSA and project activities are carried out by people during the course of other activities. This means that in spite of the lack of a budget category, long term training in health education often starts before the project is funded and always continues after it is completed.

ADP has no specific allocation for education; they included in the budget funds for administration and technical services. Examining project costs reveals that the total cost is modest. Educational materials and training are developed by the education department (an overhead cost) and educational activities are covered in technical service and administration budgets.

7.6 Constraints

Major constraints to the success of health education programs are listed below:

- Accessibility of the communities;
- Need for a long-term effort beginning well before the initiation of the project and a continuing effort after completion of the project;
- Level of education of the community;
- Highly focused interest in availability of water;
- Lack of audiovisual and other materials;
- Limited staff; and
- Lack of follow-up by government agencies.

Chapter 8

ADMINISTRATION AND MANAGEMENT

8.1 Institutional Arrangements

CRS and project holders maintained effective relationships with other institutions which could provide inputs and assist in project accomplishments.

8.2 Coordination

Inter-institutional coordination is usually not a problem as there are few other institutions which are prepared to provide any service to these communities. SDM coordination with ASECSA seems to be adequate. If ADP enters into the ASECSA group, it will probably develop a coordinated system of training to supplement its present activities. CRS does not see a need to bring different project holders together to share information.

The planning for coordination among the different departments of ADP is excellent, but more attention needs to be paid to flexible and effective implementation of training.

Coordination within the SDM program is simple, informal, and effective.

8.3 Current Funding Status

Estimated total project costs and the AID/CRS contribution are shown in Table 1, Annex 1.

The consultants also examined the cost figures per capita, per organization and per family. They found that the number of variables involved in making an assessment of relative costs are so great as to preclude significant conclusions. Unless a much more detailed study is conducted on distance to water source, dispersion of the community, and organizational resources available, no comparisons are possible. It is not clear that further analysis beyond the gross cost per capita for each project now maintained would provide useful information.

SDM is able to implement projects at a lower cost because of low overhead and additional resources, but there are severe limits to the number of projects it can undertake. ADP has a supporting staff and an Education Department and can operate nationwide. The problem for ADP is to provide the services of an integrated program while controlling overhead costs. The problem for SDM is incorporating community skills and resources into new project implementation. With only two professionals the scope of action is severely limited and their departure would mean the end of the projects.

8.4 Information Systems and Monitoring

At the project level, the SDM system is simple, informal, and adequate for the present level of activity.

ADP is presently revising its information and monitoring systems and adding an evaluation component. The reports reviewed by the evaluation team show that the reporting process is narrative and general and minimally adequate. However, it does not provide concise and useful information to decision makers. While a Gant chart is made out during the planning stage, it is not usually referred to in the reports the evaluation team reviewed although the reports contained some useful information.

8.5 Inventories

ADP and SDM buy construction materials as needed. They have an agreement with the suppliers to buy at reduced government prices. As a result, there is no need for a warehouse.

Chapter 9

PROJECT EFFECTS

In all projects there was an increased confidence of the community in its capacity for achievement.

With some exceptions, the organizational capacity has improved. In the most successful projects, the community was collecting money for repairs, engaged in new activities, developing other groups, incorporating new people, and had already experienced some benefits from their actions. In others, there were plans for new activities, consolidation of organization skills, and requests for additional support. In these cases, there was a general sense of community potential observed by villagers, outsiders, and the evaluation team. In a few communities, the water project had not resolved internal conflicts or had generated others and considerable additional effort will be necessary to move forward.

Participation by the community, both in terms of implementation and in the process of community decisions, appears to have been increased -- indicated by the formation of new groups and new educational and other activities.

Women appear to have increased their participation because of the focus of health and sanitary education for families. In some cases, women's organizations have taken an active part in both decision-making and in ensuring benefits of the water project.

Education is the weakest link in the observable effects. The process can be examined in terms of awareness, education, and changed patterns of behavior.

a) Awareness

Even the least successful communities show changes in the awareness of the need for an adequate quantity of water for cleanliness. Therefore, there is an openness to further health education.

The most successful communities usually began with a higher level of awareness and now appear to understand the importance of water and sanitation as demonstrated by their patterns of water use and latrines.

b) Education

In the least successful communities little had been accomplished either because of limited intervention by the project holder or resistance by the community. It was usually a combination of the two with both the community and the project holder focusing on obtaining water rather than learning how to use it.

In the most successful communities significant progress had been made and observation and interviews confirmed both understanding and actions resulting from the water project.

The critical factors appear to be the original level of education of the community, the timing of health education efforts, and their continuity.

In all cases, the basis for effective health education has been created.

c) Changed Patterns of Behavior

In this area, improvement in simple sanitary practices was noted. Cleaner children, more bathing, and greater use of water for family needs were noted.

In many communities it was possible to determine that at least some of the people were using latrines. In the most successful ones there was peer pressure to build and use latrines. In some other communities it was clear that only lip service was being given to the idea even when latrines had been installed.

A few changes were noted when people stated that they were attending health education sessions, changing their diet, using oral rehydration salt (ORS) solutions for children with diarrhea, and boiling water when children are sick.

The short duration of the project and the brief visits of the evaluation team precluded any serious investigation of behavior change.

In the same sense it was possible to obtain information and subjective confirmation of a reduction in diarrhea but little data was available that would give traditional validity to the findings.

Table C-1, which was reviewed in Chapter 3 of this appendix, indicates the apparent increases in organizational capacity, awareness and health knowledge and participation on a village-by-village basis. The table indicates that more progress was made in the first two aspects and limited achievement in the third. The potential for greater participation with minimum additional intervention exists in all communities.

Chapter 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 Project Development

10.1.1 Conclusions

1. The policy of CRS-Guatemala to delegate responsibility for project development to two very different organizations working in different areas has resulted in a generally effective program. More importantly, the diverse strategies provide instructive cases which will assist in the determination of a future strategy.

2. The policy of identifying priority geographic areas for concentration is well conceived and followed by both project holders.

3. The nature of the different strategies indicates there could be significant benefits from the interchange of information. However, CRS would have to become more involved in the development of strategies if this were attempted.

10.1.2 Recommendations

1. CRS should bring together the two agencies and develop with them a common set of strategies that will take advantage of the strengths of each.

10.2 Community Selection and Participation

10.2.1 Conclusions

1. Selection criteria were clearly applied and were generally adequate. CRS policy on the level of service is to promote patio connections but let the communities make their own decisions; however, patio connections are universal.

2. Organizational development depended on the level of education and previous accomplishments. The implementation method provides excellent potential for community management of current activities and for subsequent community undertakings. Community organizations were usually adept at managing the actual construction. The ADP training program, however, also solved some potentially serious organization problems.

3. Except where major economic or maintenance problems occur, committees appear able to collect and manage funds. Some communities converted their water committees into improvement committees and initiated other activities. Others languish. The difference appears to be the quality of the initial leadership and the training provided. The ADP training plan for leadership is excellent. The results observed were mixed. Two communities are constructing additional buildings using the same techniques of the water program even after two years. Several other committees, in spite of good leadership and excellent training efforts, have no plans for undertaking any necessary next steps.

4. Participation in the planning, implementation and sharing of benefits was accomplished in most projects. Communities with previous organizational accomplishment progressed significantly and others have developed a potential which needs additional support.

10.2.2 Recommendations

1. CRS-Guatemala should support some informal follow-up sessions for maintenance persons, health promoters, and presidents of local organizations to examine the present status of capacities for maintaining organizational, system maintenance, and health education activities. From these meetings determinations can be made on how communities can assist each other and about financial or other needs for future action. Such a program would use experienced persons and community leaders for technical assistance to other communities. This will benefit both the providing and receiving communities with limited supervision.

2. The level of service planned for any new projects should be examined carefully. There are important questions to be raised about the value of patio connections. House connections should not be allowed. There are of course many problems with standpipe location and maintenance. Cost effectiveness must be weighed against the convenience of family patio connections. We observed that many patio connections were for extended families of as many as 20 people. However, more people could be served if standpipes were used and methods developed to assure their proper use. People who must travel a kilometer for water may be willing to accept a nearby standpipe which they were sure would be properly attended. Each case should be examined in terms of community dispersion, cost effectiveness, and community support.

In general, we recommend standpipes unless communities are willing to pay for patio connections.

3. Since SDM does not have the capacity for training community organizations, it should either change its selection criteria so as to work only with communities having a potentially strong organization (such as Chucuilil) or develop a team of people from communities with successful organizations to assist in the community organization process.

4. ADP should consider concentrating on small, less well organized communities since it has an excellent and proven battery of resources for developing organizational capacity. Some additional staff and some effective monitoring are required to implement this capacity. ADP and SDM should combine their contacts with ASECSA to see how the present work with SDM can be made more constant and expanded to the communities served by ADP.

10.3 System Design and Construction

10.3.1 Conclusions

1. The design approach of SDM lacks some important elements. SDM does not presently follow any design standards, nor apply formulas in the design.

2. ADP has its own set of essentially national design standards, with a few modifications. However, design standards could still be improved. Water demand projections and design periods may be inadequate.

3. Design procedure is adequate, except that water demand is not used to size the distribution system -- the capacity of the water source is used.

4. Detailed design of structures is well adapted to the local conditions. However, a few changes could improve the design significantly.

5. The water supply systems were of a very simple design. Gravity flow systems are used; they work by themselves without the need of an operator. Gate valves are the only control those systems have. Storage tanks have been designed to allow for water to be bypassed during tank maintenance. Air relief valves are installed in those places as needed; they work automatically. In the case of SDM no gate valves are installed in each branch. Because of that, reliability of the system to provide water is diminished.

6. Water quality of projects is better than from old sources, but still it falls short of minimum water quality standards. In several instances, water was observed or reported with worms, fish or soil. This condition is likely to prevent its usage. Bacteriological information from several water supply systems indicate that water delivered does not meet water quality standards, and most communities still boil their water.

7. Water quality checking in the case of SDM is seldom conducted at water sources in projects. Physical-chemical tests were never conducted and bacteriological tests were conducted in only two projects constructed with CRS funds. In the case of ADP, water quality checking is adequate during the design phase.

8. Average distance to water supply source has been greatly reduced -- from 3 kilometers to about 10 meters.

9. Quantities of water available for the community are adequate. Water consumption has increased, due to water being closer to the consumer. Only one tap visited was leaking. Water committees seemed to be very aware of water conservation. No water leaks in the distribution system were reported.

10. SDM construction is adequate but may be improved. Intake structures, storage tanks, river crossings, and patio connections are well constructed, in general. In only one case was an inadequate installation observed, i.e., a PVC pipe crossing installed over the Inter-American Highway.

11. ADP construction is also adequate but can be improved. In one case a pipe crossing was installed lower than the flooding level. During a high flood event, this pipe broke.

12. Supervision during construction seems to be adequate, but it is dependent on the presence of Dr. Enrique Vasquez, in the case of SDM projects, or of a TAR in the case of ADP projects. Their constant presence at the construction site is almost impossible.

13. Water quality control is not practiced by SDM or ADP. Chlorination of the distribution system prior to use is not practiced. Pressure tests are also not conducted.

14. The systems visited are new and have been operating, at the most, for two years. Some of them have been "tuned up," some of them may need to be improved, but in general, construction is solid and well finished.

No problems are foreseen to prevent the system from operating for 20 years.

15. There is little supervision of the sanitation program by either SDM or ADP. They advise and demonstrate to the community how to prepare and install the latrines. SDM does not include this program during planning of the project.

16. Latrines seem to be well designed. Depth, capacity, and location are adequate.

10.3.2 Recommendations

1. SDM should use ADP design standards or develop its own. A design procedure, through the use of tables, should be developed to calculate pipe sizes and head losses.

2. For both SDM and ADP, the use of the flow capacity of the spring for the sizing of the distribution system should be eliminated, and use of water consumption factors should be implemented.

3. ADP should analyze and correct, if deemed necessary, the design period and the water consumption factors. None of these steps involve complicated problems and could be easily undertaken on either an in-house or a contract basis.

4. SDM design practices on the use of the overflow/drain piping should be implemented by ADP.

5. A water faucet should be installed upstream of the gate valve in both the storage tank and the intake unit to help in the cleaning of these structures.

6. SDM should install gate valves in each branch to be able to isolate them without disturbing the rest of the system (especially during repairs).

7. Water quality of springs should be checked during both dry and rainy seasons, not only during the design phase, but also during construction and operation. During operation water should be tested at the source and at the tap. Bacteriological and aesthetic quality should be the main concern. Physical-chemical tests should be undertaken less frequently, perhaps once a year.

   Simple water analysis kits should be provided to both SDM and ADP. This should be included in the budget.

Also included should be funds for the collection and analysis of samples during the operation of the system.

8. Flood data, pipe material, pipe protection, and water quality should be considered during the design. Water in Xatinap is corrosive and may affect galvanized pipe and the quality of water. Drainage of water should be provided at valve boxes.

9. ADP supervision should be more frequent and more time should be spent on it. Engineers should have a specific schedule and be available to TARs or local people as required. A community counterpart to the TAR or SDM technician should be chosen from the members of the committee. This person should be trained to understand the whole project. In the absence of the project supervisor, he or she would be able to make decisions.

10. Water quality control should be enhanced. Chlorination to clean pipelines, storage tanks and intake boxes should be practiced. Pressure tests in distribution systems should be conducted. National standards or the American Society for Testing and Materials (ASTM) standards should be used to determine maximum pressure and allowed leakage.

11. More supervision should be given during construction of latrines. Proper usage and maintenance should be taught during construction.

12. Exposed PVC pipelines should not be allowed in water systems. Careful planning on pipeline routes should be implemented.

10.4 System Operations and Maintenance

10.4.1 Conclusions

1. Some practices on water taps are unhealthy. In several instances, water faucets were observed with plastic wrapped to the outlet or with a piece of hose connected to it. People said that plastic wrapping prevents splashing.

2. The stock of materials left for O&M is usually adequate. Glue and washers were not available.

3. Water system operators appear to be knowledgeable about the operations and maintenance of the water system.

4. Collection of O&M fees through water rates seems inadequate.

5. There is no maintenance program for chlorination of water intakes, storage tanks and distribution lines, nor for periodic flushing of lines.

10.4.2 Recommendations

1. Plastic wrapping or hoses in water faucets should be eliminated. Flow restrictors may solve the splashing problem and may reduce water consumption.

2. Project holders should continue training members of the community in the construction and O&M of the system and on methods for obtaining better quality water.

3. Regular meetings should be held on O&M practices not only within each community but among communities.

4. Water samples should be taken and analyzed regularly to monitor the condition of the system.

5. Provisions should be taken, during the planning of the budget, to insure that a good stock of supplies is left in the community.

6. A study should be conducted to determine appropriate water rates.

7. Chlorination of storage tanks, intake structures and distribution, and flushing of lines should be integrated in the O&M practices.

10.5 <u>Human Resources Development</u>

10.5.1 Conclusions

1. The dedication of the CRS staff, the project holder personnel, and key community members is quite remarkable.

2. Each project holder has a different training style. ADP consciously develops new approaches but has been weak in implementation. SDM uses a hands-on problem-solving approach with long continuity.

3. The effectiveness of training was also influenced by the level of education and the timing of the training activities.

10.5.2 Recommendations

1. ADP should use the long-term training of the Health Education Training Center (ASECSA) as SDM does now.

2. CRS should assist each project holder in combining the best features of each other's approach.

3. More attention should be given to the implementation of training activities and developing a strategy for longer-term training.

10.6 Health, Sanitation, and Water Use Education

10.6.1 Conclusions

1. The urgent need for water as a convenience makes the problems of education more difficult.

2. The level of education, community access to health services and the continuity of health education exposure are critical factors in project achievement.

3. The selection, use, and training of locally based health promoters at the earliest time is critical to the success of water use and health education approaches.

4. Sanitation and latrine usage are other areas, which, although crucial, are often weakened by the desire of the communities and the organization to focus on water system construction. We confirmed a previous study carried out by Dr. Vasquez of SDM, which found that an on-going health program and the level of literacy are critical factors to successful latrine programs. However, the follow-up practices of SDM project training of health promoters and the incorporation of teachers and other public and private agencies are developing organizational capacity.

5. The project holders have taken important initiatives in the planning of methods to deal with health education problems. In spite of some excellent follow-up activities and efforts to increase the emphasis on these aspects of the project, this is the weakest part of the implementation process. However, there are enough specific successes in implementation which have resulted in changes in community attitude, habits and behavior to indicate that a participatory review of the present situation (through the planned follow-up and evaluation of ADP or through CRS-SDM discussions) will produce some extremely useful results.

10.6.2 Recommendations

1. In practice the selection of a health promoter and the attendant training should begin as soon as the project is approved.

2. CRS should include funds and assist project holders in obtaining and distributing health information materials and audiovisual training aids.

3. CRS should explore with the project holders the availability of latrines and provide funds in the project to start a sanitation program concurrently with the water program.

10.7 Administration and Management

10.7.1 Conclusions

1. The CRS approach to management is innovative and many of the implementation procedures are experimental. Therefore, there is a need for both CRS and project holders to re-think the monitoring process. That process should encourage flexibility and responsibility and promote a focus on longer-term community benefits. The integrated implementation process of these projects requires more supporting assistance than is presently given, whether through coordination of local resources or from the adaptation of implementation plans on the spot and greater support and supervision from project holders.

2. CRS project approvals once the projects are presented have been expeditious, and payments for the entire project prompt. CRS has been flexible and supportive of the project holders, has shown interest in the activities, and has conducted project monitoring through visits rather than requiring frequent written reports. CRS also supported one study of the SDM communities.

3. CRS has not paid enough attention to the follow-up aspects of the projects, nor have the project holders given enough attention to this critical factor.

4. Reporting procedures are adequate. However, the informal monitoring process does not provide the type of input and objectives-focused information needed by project holders or CRS.

10.7.2 Recommendations

1. Evaluation should be limited to measurements of coverage and effects. Project holders, together with communities, should now devise simple indicators of progress and put them on a form showing what was planned during the period, what was accomplished, what needs to be done, and who will be responsible.

2. Frequency of monitoring should vary with the stage of implementation and be followed by a regular review meeting with key participants where action to be taken is agreed upon. Emphasis needs to be placed on contacts and exposure and on the corresponding actions that result from organizational and educational efforts. The best example is the monthly follow-up efforts with the health promoters being carried out by SDM.

3. No new elements should be added until implementation approximates design much more than it does now. Simple improvements in supervision, training, communication and information systems, and the examination of community resources can help solve many problems.

4. Both SDM and ADP should stimulate interest in private and public agencies responsible for literacy and health education in the communities in which SDM and ADP are planning projects. Such work as is being done in assisting community organizations to obtain other grants would be helpful. Also, a list of the organizations in Guatemala that could provide either grants or assistance to community activities would be helpful.

10.8 Project Effects

Among the more obvious effects were the following:

1. Water was provided to communities that previously had no immediate access to acceptable water supplies. Not only was more water available and used, but more time is now available for activities other than hauling water.

2. Children and communities were cleaner.

3. There was a new confidence in communities' capacity to accomplish their objectives.

4. Organization, participation and health knowledge increased in varying degrees in most cases.

5. CRS learned how difficult it is to implement projects in remote areas.

6. The few spinoff activities observed during the visits indicate possibilities for continued community efforts. Communities are attempting to construct roads and community center schools, and become directly involved in health education. Other activities such as handicrafts, home gardens, fruit orchards, and home improvement are examples of activities that could be undertaken by local committees. ADP staff have said that they intend to promote such activities in the near future.

ANNEX 1

Guatemala Projects
under USAID/CRS Program

GUATEMALA PROJECTS
UNDER USAID/CRS PROGRAM

	Name	Type	Total Cost	CRS Cost	PCTG.	Benef. Pres.	Benef. Design	T. Cost/ Capita	T. Cost/ Capita Design
1.	Ticanlu	GH	$ 28,910.36	$ 5,265.61	18.21%	240	360	$120.46	$80.31
2.	Santa Rita	GH	25,276.02	14,776.02	58.46%	900	1,350	28.08	18.72
3.	Chiquix	GH	20,690.00	13,190.00	63.75%	668	1,002	30.97	20.65
4.	La Laguna	GH	144,554.69	85,567.57	59.19%	2,478	3,717	58.34	38.89
5.	Buxup	GH	62,030.19	20,508.12	33.06%	1,204	1,806	51.52	34.35
6.	Inchewex	GH	83,342.63	65,440.86	78.52%	1,531	2,297	54.44	36.29
7.	Patzij	GH	11,663.70	6,837.88	58.63%	480	720	24.30	16.20
8.	Paqui	GH	5,102.70	3,110.00	60.95%	164	246	31.11	20.74
9.	Chuchexic	GH	1,995.30	1,290.00	64.65%	200	300	9.98	6.65
10.	Xatinap	GH	193,496.40	169,486.94	87.59%	4,000	6,000	48.37	32.25
11.	Chucuilil	GH	10,591.97	6,955.95	65.67%	920	1,380	11.51	7.68
12.	Barrio S. J.	GH	7,587.23	3,682.23	48.53%	190	285	39.93	26.62
13.	Pobl./Chojujup	GH	6,862.00	3,889.00	56.67%	800	1,200	8.58	5.72
14.	Xec Alibal	GH	4,875.00	3,118.00	63.96%	165	248	29.55	19.70
15.	Ojobna	GH	15,095.33	11,362.33	75.27%	240	360	62.90	41.93
16.	La Fe	GH	12,060.00	7,696.00	63.81%	450	675	26.80	17.87
17.	Xoljuyub	GH	3,561.95	2,450.84	72.30%	342	513	11.52	7.68
18.	San Francisco	GH	8,776.00	6,362.00	72.49%	540	810	16.25	10.83
19.	Xepatuj	GH	9,408.00	6,908.00	73.43%	555	833	16.95	11.30
20.	Palanquix	GH	17,995.00	12,995.00	72.21%	768	1,152	23.43	15.62
21.	Chalum	GH	72,988.00	56,750.00	77.75%	1,200	1,800	60.82	40.55
22.	La Mesta	GH	49,628.00	36,363.00	73.27%	930	1,395	53.36	35.58
23.	Quetzal	GH	48,168.00	38,310.00	79.53%	890	1,335	54.12	36.08
	Sub Total		**$845,035.52**	**$582,712.51**	**68.96%**	**19,855**	**29,783**	**$ 42.56**	**$28.37**
	Feasibility Studies		$ 4,149.53	$ 4,149.53	100.00%				
	GRAND TOTAL		**$849,185.05**	**$586,862.04**	**69.11%**				
	Averages		$ 36,740.67	$ 25,335.33	64.26%	863	1,295	$ 37.97	$25.31

Notes: G = Gravity System
H = Household Connections

ANNEX 2

Photographs

Photo 1. Solid construction of storage tank - Xoljuyup.

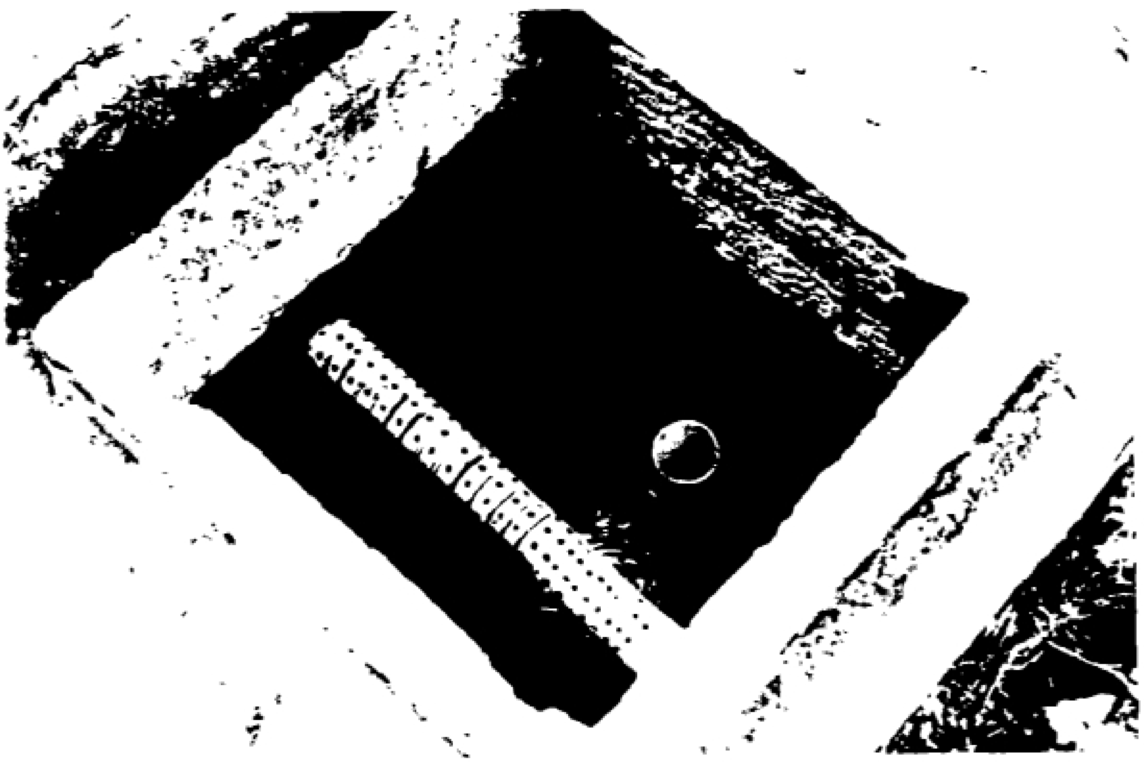


Photo 2. Good intake structure design.

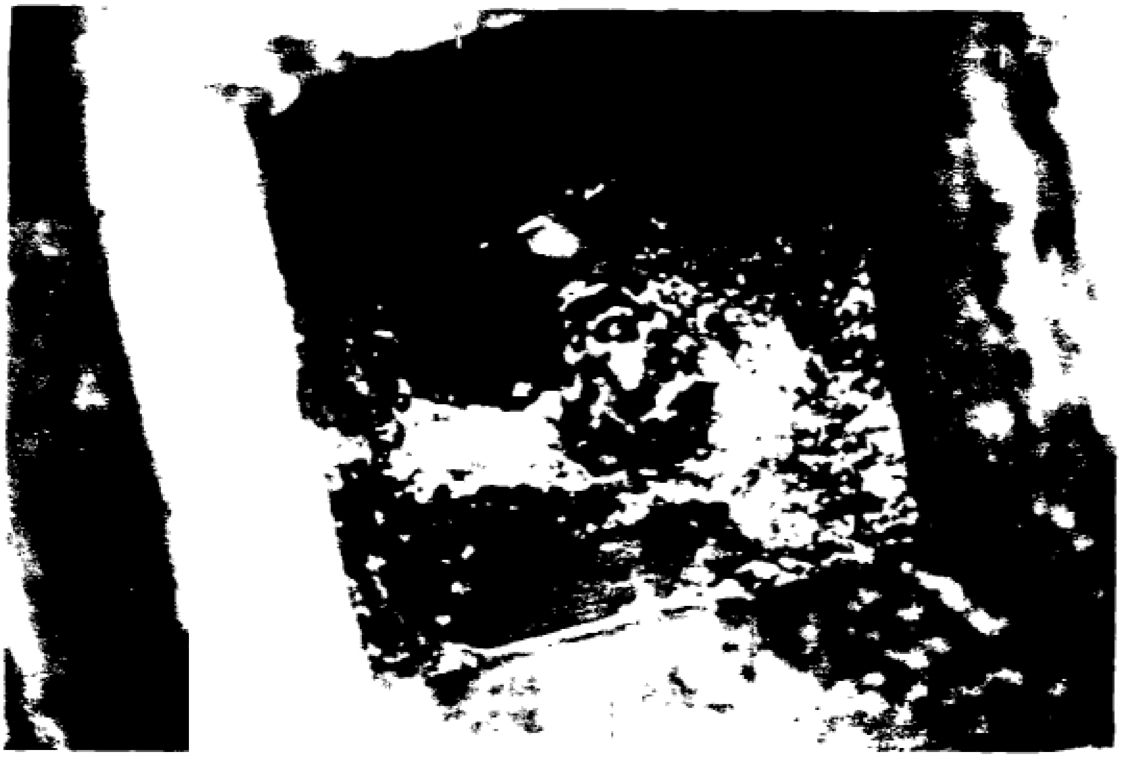


Photo 3. No drainage in valve box. Floor is made of concrete.

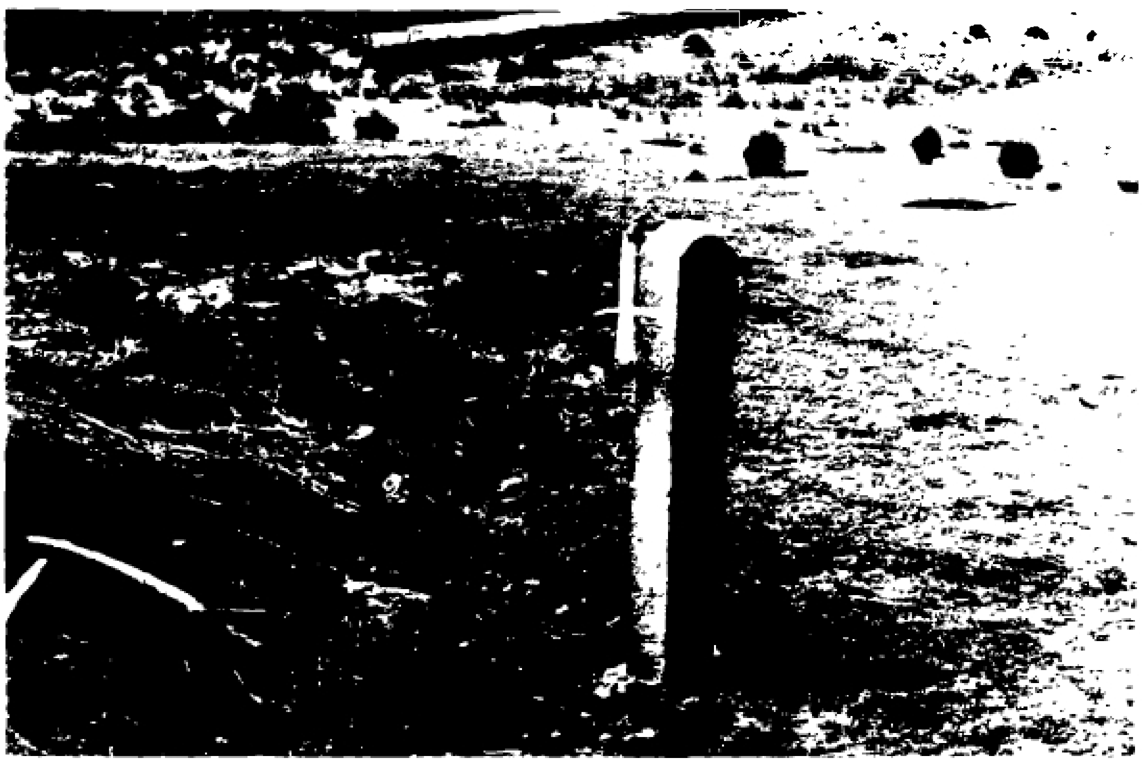


Photo 4. Tap wrapped in plastic - Chiquix.

Photo 5. Adequate river crossing - Chiquix.

Photo 6. Inadequate highway crossing - Chucuilil.

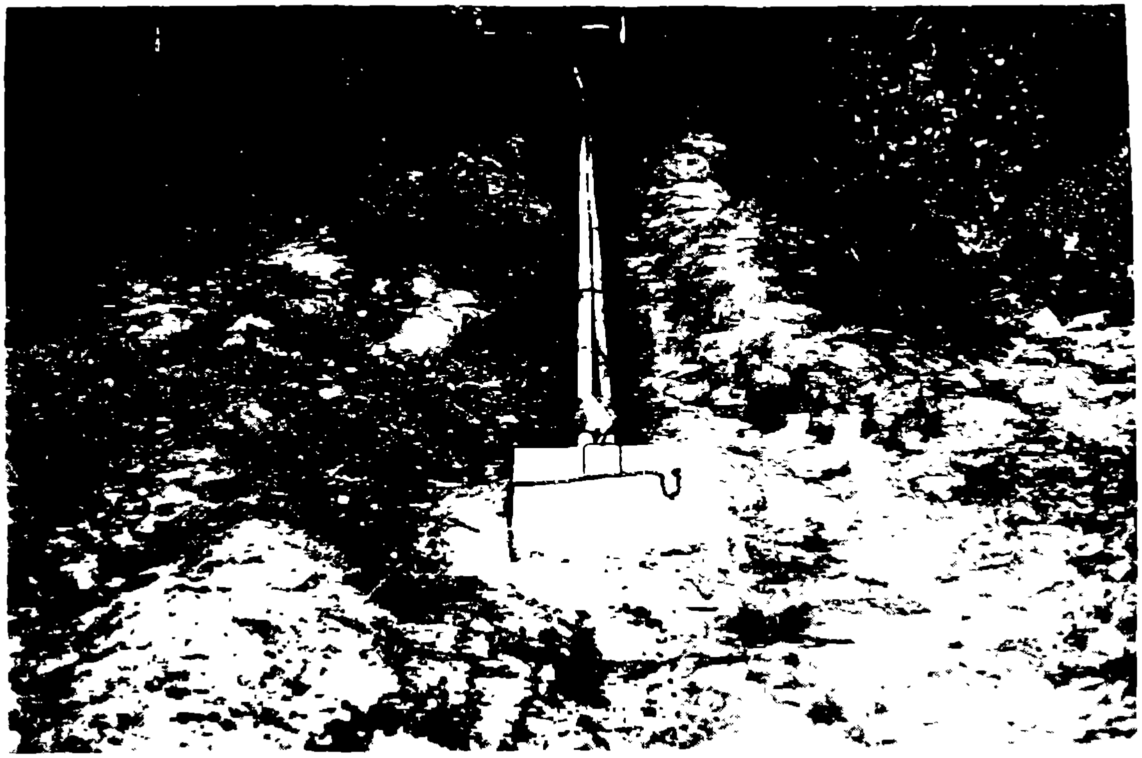


Photo 7. Uncovered pipeline. Water project is operating - Xatinap.

Photo 8. Septic tank made with local materials.

Photo 9. Latrine with cover - Chojujup.

Photo 10. Latrine without cover - Chucuilil.

Photo 11. Provision of water is only one factor needed to reduce outborne disease. Health education is another.

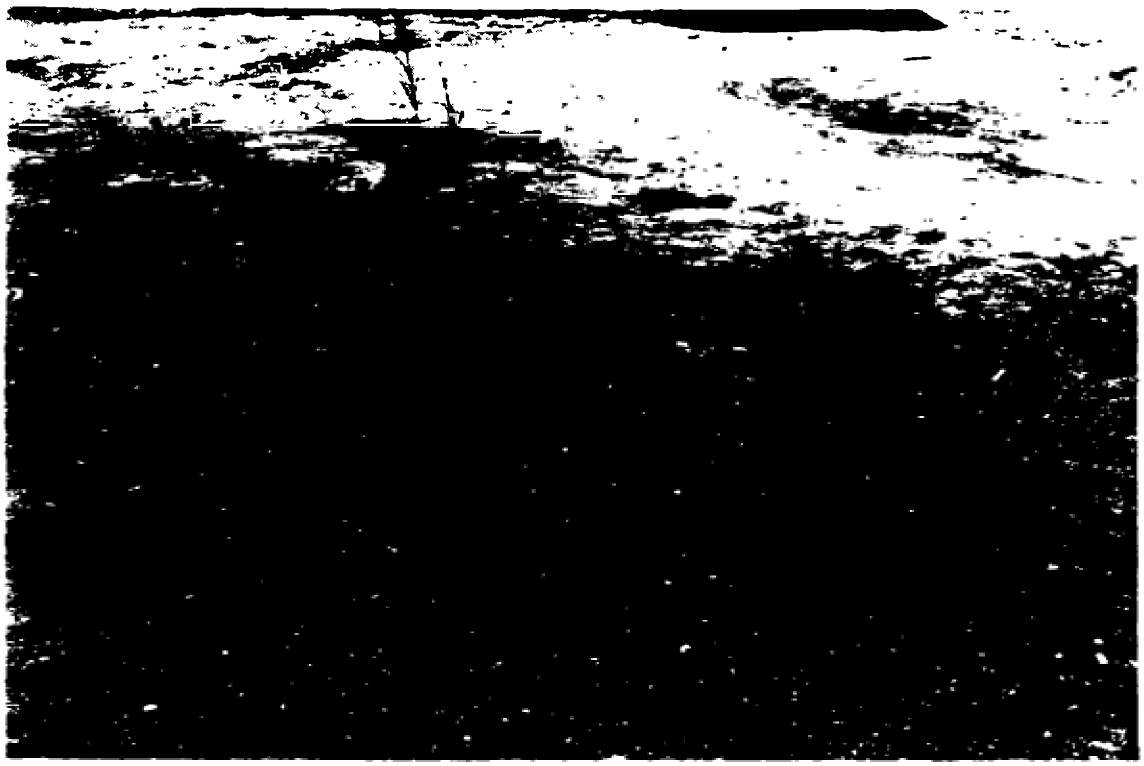


Photo 12. Reforestation of watersheds - Xatinap.

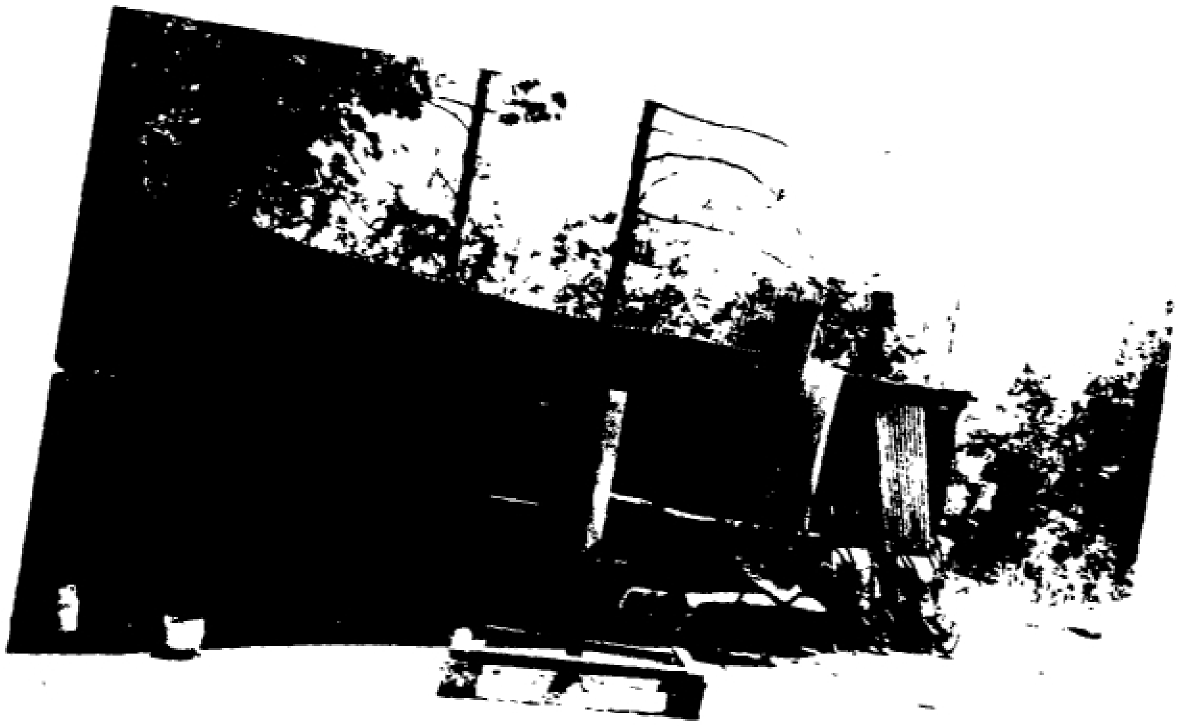


Photo 13. Community warehouse - Xatinap.

ANNEX 3

Key Individuals Contacted

KEY INDIVIDUALS CONTACTED

AID

Tom Kellerman	Deputy Program Officer
Roberto Perdomo	Program Section
Victor Dardon	Chief Regional Engineer, ROCAP
Ing. Roberto Figueroa	Project Manager, Environmental Sanitation
Paul Wrobel	PVO Officer

CRS

Mark Dan Moriarty	Representative
Wilma Paniagua	Project Official

AGUA DEL PUEBLO

Ing. Emilio Falla	Deputy Director
Ing. Carlos Gomez	Director
Julio Hernandez	TAR, Huehuetenango
Armando Mêndez	TAR, Xatinap

SPOKANE DIOCESAN MISSION

Sister Sheila	Monastery at Novillero
Dr. José Miguel Vâsquez Yaxon	Project Holder
Enrique Vâsquez	Technician

APPENDIX D

FIELD REPORT ON EVALUATION OF CRS PROJECTS IN HONDURAS

by

Richard Duncan
and
Homero Silva

APPENDIX D

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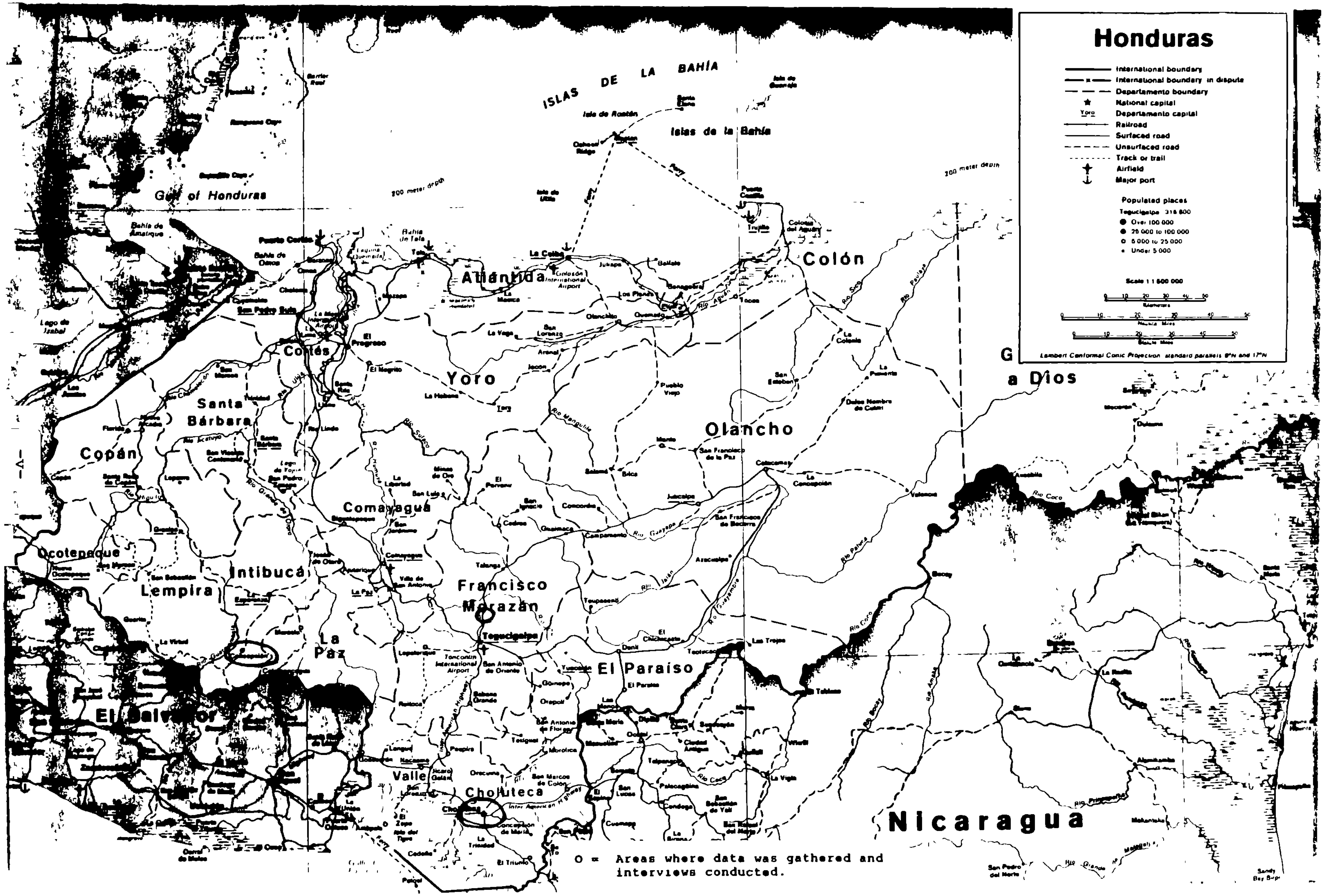

O = Areas where data was gathered and interviews conducted.

ACKNOWLEDGMENTS

The Catholic Relief Services (CRS) field office, EDUCSA, and the project holder Caritas in Choluteca and Camasca contributed to the speed and economy with which the field work was carried out.

It was most fortunate that the CRS field office in Honduras is staffed by professionals familiar with the Agency for International Development, national agencies, and other private voluntary organizations (PVOs) operating in the country and in a position to lend vital assistance. The field team received invaluable support from the CRS Representative, Mr. Patrick Ahern.

Special credit is due to Ing. Miguel H. Flores from CRS and German Licona from EDUCSA. They were instrumental in making preliminary contact with communities visited, and were invaluable as active participants in the evaluation themselves. The respect and affection with which they were greeted at one after another of the communities contributed greatly to the good reception enjoyed by the evaluation team.

We would be remiss if we were to overlook the encouragement received from the New York office of CRS. Mr. Ray Victurine made possible the active participation of the CRS personnel.

The USAID Mission provided valuable assistance during the briefing and debriefing meetings. We express our gratitude to Ing. Betty M. Facey, Chief Engineering Officer, and Ing. Edmundo Madrid, Coordinator of Rural Water Supply and Sanitation Projects.

Many other individuals contributed to this effort. Unfortunately, there is not enough space to list them all.

LIST OF ACRONYMS

ASTM	American Society for Testing and Materials
EDUCSA	Educación Comunitaria Sociedad Anonima (Corporation for Community Education)
gpcd	gallons per capita per day
gpm	gallons per minute
LDC	Less Developed Country
PVO	Private Voluntary Organization
lpcd	liters per capita per day
Lmp	Lempira (currency in Honduras): Lmp 2 = U.S. $1
SANAA	Servicio Autonomo Naciónal de Acueductos y Alcantarillados (National Autonomous Service for Water Supply and Sewerage)

Chapter 1

INTRODUCTION

During the period of the project, CRS-Honduras has worked with different communities in the selection and conduct of these projects. The major concentration of these projects was in Choluteca and Intibuca. The program consists of 18 projects, involving 46 communities. Projects in 21 communities are completed, 10 are under construction, and 15 are in the design stage. The total cost of the projects is $538,665.36 of which CRS cost is $411,978.17.

The total number of beneficiaries presently planned is 12,538 which will rise to 20,061 at the end of the 20 year design period, based on a 2.5 percent population growth. The per capita cost of the projects averages $53.53. Detailed costs are shown in Annex 1.

The purpose of the WASH team visit, by Drs. Richard Duncan and Homero Silva, was to evaluate and assess the three-year water and sanitation program. They arrived in Honduras on October 28, 1986, and departed 14 days later. After meetings with CRS-Honduras and USAID and reviewing material on the projects, the team selected and visited eight villages. Three villages were in Choluteca, four in Intibuca, and one in the Province of Francisco Morazan. The team's approach to field work included:

- Interviews with intermediary organizations;
- Interviews with the CRS engineer;
- Interviews with EDUCSA supervisor and promoters;
- Interviews with village officials;
- Interviews with a selection of users in their households; and
- Observations of the water system (tanks, piping, water intake, and taps) and the community.

After the site visits, debriefings were held with CRS and USAID staffs. A draft report with conclusions and recommendations, framed in a provisional context designed for action-oriented decisions and future planning, was left with CRS and USAID staff.

Chapter 2

PROJECT DEVELOPMENT

2.1 Introduction

According to the Inter-American Development Bank, 51.2 percent of the Honduras population had water supply service in 1982; only 26.6 percent of the population had household connections, however, and in the rural areas that figure dropped to 11 percent.

More significant are the figures on the distribution of water systems by size and population. Figure D-1 shows that almost all of the communities with population over 1,000 have water systems. Below that level, the number drops off sharply. At the lowest level, for communities of fewer than 100 people, fewer than 600 of the 13,229 communities have water systems.

It is at this level of small communities that the CRS-Honduras water projects are aimed. The program consists of 18 projects involving 46 communities. Projects in 21 communities are completed; 10 are under construction, and 15 are in the design stage.

Due to the direct involvement of CRS Honduras in project implementation, the water program also includes a technical feasibility project which provides an engineer in CRS's office in Tegucigalpa, who performs the feasibility studies and supervises the technical and organizational aspects of the project.

A health education project is implemented through a contract with EDUCSA, a Honduran private voluntary organization (PVO) which provides health education and training to communities selected for the water program. This contract, initiated at the beginning of 1986, is scheduled to end at the end of 1986.

2.2 Program Approach

During the period of the project, CRS-Honduras accepted requests from and worked with different communities in the selection and conduct of these projects, which are concentrated in Choluteca and Intibuca. The initial selection of projects was by Caritas (a relief organization funded by U.S. Catholic churches) in Choluteca, and by an active and highly respected parish priest in Intibuca. All but one of the projects visited by the evaluation team were in these two areas. (See Annex 2 for selected community photographs.)

In addition to general isolation and lack of government services, the five-year drought in the Choluteca area, which has devastated the poor farmers, and the effective organizational structure of Caritas have influenced CRS in its decision to concentrate projects in this area.

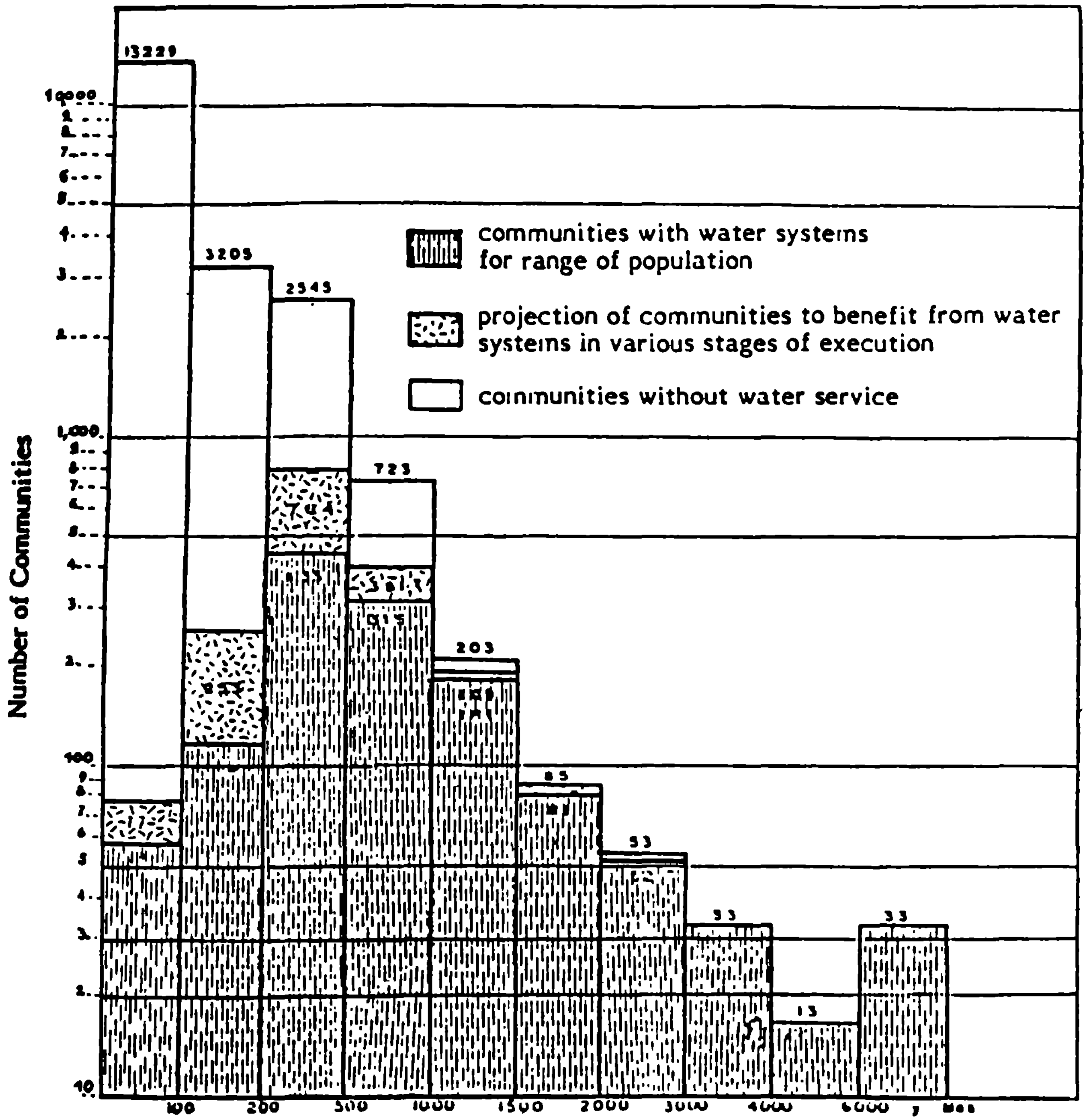

FIGURE D-1

Number of Communities of Different Sizes Served by Water Systems

In Intibuca there has been friction caused by extensive assistance to Salvadoran refugees. The water program, therefore, provides a tangible immediate benefit to Honduran communities in the area and may help reduce some of the tension.

Requests for projects in both areas are funneled through the diocese or Caritas channels. The CRS engineer then undertakes the studies necessary to determine the technical feasibility of the project. He also meets with the community to determine its readiness to undertake the project and to inform villagers of the specific responsibilities which they will assume.

In both areas, projects are accomplished in coordination with church organizations which have a network of social and religious workers assisting the communities. They also provide the communication linkages between CRS and the project communities.

As soon as an agreement has been signed, EDUCSA assigns a promoter to the project to initiate a program of training and educational support. Technical training is provided by the supervising engineer, the mason, or other qualified persons during the course of the construction. The community is also encouraged to participate in other training opportunities (government or church-related).

It is therefore assumed that by the end of the construction phase, the community will have obtained the skills required to maintain the system. They should also have improved their organizational capacity and their awareness of the importance of health education.

While no decision has been made about the follow-up activities of EDUCSA, the assumption is that community members will participate in an ongoing program of health education. In addition, there are Caritas, church, and government activities which provide limited opportunities for continuing training. The church programs have regular meetings of representatives of the communities to discuss problems and decide on ways to meet new needs of the communities. (See Annex 3 for a list of key individuals contacted.)

Chapter 3

COMMUNITY SELECTION AND PARTICIPATION

3.1 Criteria for Selection

CRS-Honduras has a very well defined set of selection criteria for water and sanitation projects. They are as follows:

1. The community should have a real need for the water supply project which will serve as a means to improve the health of the inhabitants of the community.

2. The water supply source capacity should be equal to or larger than the peak day water demand of the community.

3. The water supply source location should be at a higher elevation than the community, so that a gravity system can be installed.

4. The community should own the water rights to the source, or at least have a written access and use agreement signed by the owner.

5. The community should have easements where the transmission line is going to pass.

6. The community should sign an agreement with CRS in which the community agrees to the following:

    - Follow CRS guidelines on the system construction

    - Receive training on organization and health education before and after the completion of the project

    - Receive training on the operations and maintenance (O&M) of the water system to ensure that the whole community is able to operate the system

    - Supply the following:

        - Skilled and non-skilled manpower
        - Local materials (sand, stone, gravel, and wood)

- 5 to 10 percent of the cost of non-local materials
- The O&M cost of the project, which varies from Lmp 0.50 to Lmp 2.50 per connection per month (U.S. $0.25 to $1.25)

7. The water committee is obligated to send a monthly report to CRS on the financial status and the level of operation of the water project

8. The community is obligated to inform CRS and apply for authorization prior to changes or enlargements in the project.

In general, the community selection criteria are well applied and clearly defined. Several communities visited did not meet the second and third criteria. CRS does not have a cost limit in its selection criteria; this is a serious shortfall of the program. Available funds might reach more beneficiaries if a cost limit had been established at the start of the program. Eng. Miguel Flores explained that CRS has not had problems with distant, more costly water sources. This matching grant project has focused on small communities, without considering the location of the water source. In Intibuca, the distance to water sources varies from 1 km to 4 km. In Choluteca, the distance to the water source is as much as 10 km, but this water source serves four communities. In very small communities, the distance to the water supply source, in combination with community size, is used as a criteria. If the community is small--fewer than 100 persons--and the distance to the water source is more than 5 km, the source is not developed.

3.2 Size of Communities Selected

No limit on population size was established in the matching grant. Communities chosen were small and poor and have a very hard time getting government assistance on water supply and sanitation projects. The majority of the projects involve from 20 to 60 families; on average each family has eight members. Few projects involve more than 100 families--municipalities do not benefit from this grant because they have a better opportunity to get government aid.

Some people would prefer to have the money of the matching grant invested in larger size communities. They argue that a significantly higher number of equally needy people can benefit due to the economies of scale. However, it is the team's opinion that larger communities have a better chance to receive government aid. Hence funds available from this grant are being well applied.

3.3 Levels of Service and Community Coverage

3.3.1 Levels of Service

CRS does not have a policy on minimum levels of service. However, patio connection service is the most frequent level of service provided to the communities. CRS officials have stated that standpipes are not appropriate for Honduras because they are not socially acceptable. People in Honduras are radical; they like to have water at their homes or get it from the spring, but not from a standpipe. They also argue that people do not take care of the standpipe and that the collection of fees is almost impossible. (The experience in the Dominican Republic shows the opposite, i.e., a well-organized community is able to maintain a standpipe without any problem.) Team members observed that water wastage (faucets continuously running water) is a problem in communities with poor education on water conservation. It is the opinion of the team members that CRS must only provide for standpipes and that if the community desires house connections, the community must pay for the difference in cost.

It is worth mentioning that a wide range of levels of service are possible. Financial considerations (i.e., willingness and ability to pay) should be a principal factor in setting levels of service. The service available to a given community generally is defined in terms of distance to the water distribution point, i.e, standpipes, patio connections, and house connections.

In addition, the level of service may also be defined as whether the system operates continuously or intermittently. The intermittent level of service (where water is not provided all of the time) may permit distribution system designs to meet either the average day or maximum day demand, but not the peak hour demand. This level of service will permit some savings in money because the diameter of the piping is smaller. The continuous level of service is the one that has adequate water resources and is designed to meet the peak hour demand. There are many water distribution systems in the LDCs that work intermittently. Depending on the financial situation of the community, the level of service desired, the existence of adequate water resources, and the existence of standards or norms, an intermittent system may be considered.

It should be noted, however, that many countries do not permit systems to be designed to operate intermittently--there are potential dangers to health and the system may be damaged from constant filling operations.

3.3.2 Community Coverage

CRS criteria for community coverage requires 80 percent community coverage as a minimum. Hence, 80 percent of the community households must sign an agreement before a water and sanitation project is undertaken. However, the coverage is relative to the location of the water supply source with respect to the community. In La Criba, for example, due to the location of the water source, only 34 percent of the community is able to receive water.

Water and sanitation projects in those communities visited by the evaluation team cover more than 80 percent of the population. There are a few instances where water is not provided because the water source is lower than the house. In only one of the communities visited (La Criba) did people express dissatisfaction with the water supply. For the most part, people are satisfied, probably because during the planning process all of the community had the opportunity to decide whether they wanted to benefit from the water and sanitation program or not. Most of the time water is provided to all members of the community unless a person does not want to cooperate with the community.

Neither information nor time was available for a deep analysis of the projects to determine if optimum use of money was made in order to provide the maximum coverage possible. It is understood that service coverage should be selected on the basis of the location of houses, density, the cost of developing the source, and the cost of each increment of the distribution system.

3.4 Community Organization and Participation

3.4.1 Organization

Even in remote Honduran communities there has been some government or private effort to promote community improvement efforts. These programs typically formed a "patronato" or village committee which has become a common feature of most communities.

The "patronato" usually consists of a group of officers (from seven to twelve in the villages visited) who are regularly elected and who make decisions for the community and represent it to outsiders. In addition, they regularly consult the community either informally or through community meetings.

The involvement of "patronatos" ranged from those who had perfunctory functions to those who were very active and represented only one of a number of organizations in the community which were performing useful and important activities. Each of the organizations may be truly representative or dominated by a person or a small group. Most outside agencies initially coordinate through the "patronato," although there may be direct relationships to other health, agriculture or housewife groups.

The urgent need for water creates a willingness to overcome significant organizational or factional problems in order to construct the water system. However, the evaluation team did find situations in which organizational problems limited the beneficiaries to only one part of the community or increased conflict. In such cases the question to be asked is whether those communities should have been selected or if inadequate attention was given to the organizational aspect of the project.

In Honduras the relationship between the community and CRS is direct even though the Catholic agencies usually nominated communities for assistance and EDUCSA provided (under contract) health education. The design of the projects always included an explicit or implied commitment on the part of CRS, the community, and the Catholic agency to incorporate and develop community organizational capacity.

The variation observed was the degree to which careful attention had been given to organizational capacity and the degree to which training and support had been involved with organizational development.

In one community, the water project appears to have activated the "patronato" which had previously accomplished little. In another, a well-developed organizational structure welcomed an early result-generating activity which improved the community's organizational capacity. In this community there is now a need for a coordinating mechanism for the diverse activities of the many committees including the water committee. In a third, the project exacerbated conflicts to a degree that the fabric of community organization suffered seriously.

In all communities there was an understanding of the importance of organization and, in many, a new confidence that organization can produce immediate benefits. In a few communities, the project so improved organizational capacity that they were able to undertake other community priorities.

The examination of the distribution of power and responsibility in the community yielded mixed results. The evaluation team found communities which had not had effective organization that have gained confidence and initiative, some which still are dominated by a small group, and those which have significantly distributed power and responsibility.

Another critical factor observed was the capacity to incorporate other community activities and to bring in new services from other donor agencies, either government or private. Some communities were planning on using their new-found capacity to plan what they wanted; others were actively seeking assistance on new projects; and still others were still mired in factional or sterile organizational maneuvering.

The difficulties of analysis were to weigh these elements in order to understand how and under what circumstances the water project contributed to the results which were observed. There were some obvious conclusions (level of education, need, effort, and external assistance), but the evaluation team attempted to find some determinants which would correlate with similar occurrences in other communities and countries.

As in other countries that this team evaluated, a table was constructed (see Table D-1) which attempted to focus the observations on specific elements of organization, participation, awareness and education. In relation to organization, the consultants attempted to examine capacity prior to the water project, the amount of training and support given to the community during the intervention, and the organizational status after the project was completed.

In Honduras there was little correlation between the level of intervention effort and the increase in organizational capacity. Yet there is little question that the conduct of the project affected organizational capacity.

The community with the lowest initial ranking responded to intervention by improving. Others with higher ranking stayed the same, and one dropped. Those with the highest rankings improved or stayed the same regardless of the level of intervention and support.

Table D-1

APPROXIMATE CLASSIFICATION OF KEY VARIABLES RELATED TO THE CRS WATER PROJECTS IN DIFFERENT VILLAGES

HONDURAS

	BEFORE			INTERVENTION			AFTER					
	Prev. Org.	Awar. &Educ.	Part.	Trg.	Effrt.	Supp.	Org.	Chge.	Avar. &Educ.	Chge.	Part.	Chge.
Las Casitas	0	0	1	1	2	2	1	+1	1	+1	2	+1
La Jagua	2	2	3	2	2	2	3	+1	3	+1	3	0
La Criba	1	1	0	2	1	2	0	-1	1	0	0	0
Agua Sarca	2	1	2	2	2	2	3	+1	2	+1	3	+1
San Isidro	1	1	2	0	2	1	1	+1	0	0	2	0
Santa Caterina	3	2	2	2	3	2	3	0	3	+1	3	+1
Llanos	1	1	0	0	1	1	1	0	1	0	1	+1
Las Flores	2	1	2	3	2	2	3	+1	1	0	2	0

NOTES:

"BEFORE Variables" are estimates obtained from interviews and other sources on the level of organizational capacity, the degree of previous awareness of sanitation needs and level of health education, and the degree of community participation which existed prior to the initiation of the project.

"INTERVENTION Variables" are estimates obtained from reports and interviews on the amount of training provided, the level of effort in the community and the support from all outside agencies during execution of the project.

"AFTER Variables" are estimates based on observations and interviews on the present state of organizational capacity, awareness of sanitation needs, level of health education, and the degree of community participation which now exists in the community. A separate column records the change in each factor for each community. See methodological notes for the individual indicators used for each variable.

METHODOLOGICAL NOTES FOR TABLE 1

The general guidance in classifying the reports, interviews, and observations on each village visited is as follows:

COMMUNITY VARIABLES

Organization

0 = community organization exists in name only
1 = organization accepted by the community with few or no accomplishments
2 = functioning organization with some accomplishments (schools built, etc.)
3 = multiple organizations or very active organization dealing with diverse community problems

Awareness and Education

0 = extremely limited awareness of health and sanitation practices
1 = awareness of sanitation needs, little knowledge of health - no observed practices
2 = high awareness, considerable health knowledge - little evidence of practices
3 = both extensive health knowledge and evidence of regular application to community conditions

Participation

0 = community dominated by one person or group, factionalism or general lack of interest by community
1 = strong leadership and passive participation by community
2 = strong or diffuse leadership with some active participation by significant portion of community
3 = diverse groups and leadership in multiple channels and high level of active participation

INTERVENTION VARIABLES

Training

0 = no training was accomplished during the project;
1 = limited training (e.g., only in construction);
2 = in community training on different aspects of the project (e.g., organization and health);
3 = comprehensive training in health organization and construction including course away from the village for certain members.

Effort

0 = community made little or no effort to support the project
1 = community assisted in construction and little else
2 = community made significant effort to support the project;
3 = community took independent initiative to support project and made special effort toward project accomplishment (incorporated school, other community facilities, etc.).

Support

0 = neither project holder, community leadership, nor other participants gave significant support to the project;
1 = limited efforts were made by project holder and others (to provide minimum support or deal with community problems);
2 = adequate support was provided in most aspects of the project;
3 = consistent efforts were made to support community actions and attend to any project problems which arose.

The chart focuses attention on critical variables and gives a useful picture of both process and apparent effects. Yet observations indicate that careful selection, early assistance, and strong support had an across-the-board effect on all the variables examined. The factors that emerged were level of education, leadership capacity, timing of intervention, and continuity of support. However, not enough time or data was available for detailed classification, given the wide variety of circumstances which were encountered.

Confidence in organizational capacity, the planning and initial execution of other projects, improved organizational skill, and a clear potential for future organization have resulted from the conduct of the projects, even in those communities which can be considered to have been only partially successful.

3.4.2 Participation

In dealing with participation in planning, implementation, and obtaining benefits, communities showed a wide range of involvement, both before and after the water projects. In addition, communities are required to pay between 5 percent and 10 percent of the costs of non-local materials for the projects.

Participation in the decision to request the assistance and to support the project usually was accomplished through a community meeting called by the "patronato" and the requirement of 80 percent support was always met. However, in three cases the communities were split for different reasons.

In one community a previous water system installed by SANAA (the government water and aqueduct program) did not provide water for a part of the community living in higher areas. The CRS project was requested to resolve this problem. The community had two different sets of organizations. However, both parts of the community appear to have cooperated to install the system. There appears to be some improvement in the coordination between the two groups in carrying out the project, but the already significant level of participation did not improve noticeably due to the project.

In two other communities (La Criba and Llanos) the split in community participation was less benign. In one case the water source was not able to provide water for a part of the community in a higher area. The resulting recrimination was causing the community to reorganize the "patronato." In the other case an older water system which served only half of the community had fallen into disrepair. The other half of the community had an organization dominated by one influential person who was also closely connected to the church. They requested CRS assistance, received approval, and carried out a water project of their own which serves their half of the community. The community is now effectively split and it is unclear what will happen. There appears to have been cooperation in constructing the system but little improvement in the overall organizational ability of the community.

In both of these cases there is some question about why the communities were selected and approved. In the former case the EDUCSA promoter is prepared to assist with reorganization efforts and continues his training efforts. In the latter case the EDUCSA promoter has not worked in the village as yet.

Practical training is being given, however, through a national training program and the potential generated by the water project may increase participation by the community.

Participation in the planning of the systems includes only the selection of the water source, and this is subject to the technical judgments of the engineer.

As in other countries visited, the community mobilizes itself to provide the labor for the installation of the system. In Honduras, however, the entire community is trained to maintain the system, and in some communities the responsibility for maintenance is rotated among community members rather than assigned to a particular person.

The continuity of participation in communities after project completion varies greatly. In the more successful communities money is being collected for maintenance of the system, and evidence of active participation is apparent. Community organizations have proliferated, new people are assuming leadership roles, and more members of the community are involved in new and non-water related activities. These include school activities, agriculture, fish farming, health education, and other useful or productive activities.

In a few communities (i.e. San Isidro and Las Flores) conditions had reverted to the previous situation although the evaluators were told of plans for projects which had not yet been begun because material support had not been received.

Using Table D-1 to focus the analysis of participation, two communities which had very little participation appear to have improved by a small amount, and two which had a significant base of participation made impressive progress in expanding both participation and community improvement across a broad spectrum of activities. The remainder of the communities remained the same or had very limited increases in participation.

People attributed progress to the execution of the water project. Clearly it was used by many communities to incorporate more people and improve community capacity and action.

Participation in the benefits was also mixed. All communities benefited from the availability of water. In some cases where water could not be made available through patio connections, communities provided standpipes or shared with families who did not have direct water connections. Only in the one case of community conflict were there problems about the benefits.

Most communities also are enjoying the benefits of broader participation. Where the benefits are not as great as was expected, there is with one exception important progress and potential for the future.

Chapter 4

SYSTEM DESIGN AND CONSTRUCTION

4.1 Criteria for Water and Sanitation Systems

Water and sanitation projects were evaluated by reviewing some major areas in the eight communities selected. The major areas reviewed were as follows:

- source selection and measurement,
- source protection, and
- design criteria, chlorination, and breaktanks.

4.1.1 Source Selection and Measurement

Type of Source. All of the communities visited except for Las Flores were using springs as their source of water supply. Las Flores is using a solar pumping system. CRS prefers the construction of gravity-supply systems because CRS believes that a water project will be successful only if the community is able to maintain and operate it. Chlorination is not applied because (1) people do not like the taste of chlorinated water, (2) this treatment process is expensive, and (3) the technology is not appropriate.

Las Flores is a unique case. Spring water is non-existent in the near surroundings. The community was using Rio Chiquito as its source of water. Rio Chiquito receives all the sewage from Tegucigalpa, the last sewage discharge being several hundred meters upstream from the community. This river's natural flow during the summer is close to zero; the only water flowing in it is raw sewage. People used to dig holes along the river bank to get some "filtered" water. Water quality was little better than sewage.

Water Quality. In general, the water supply source selected is of better quality than the traditional source of water. This was the general belief of the persons interviewed in the different communities visited and the members of the evaluation team. Water quality testing is not conducted in any project. Physico-chemical and bacteriological tests were never conducted. SANAA recommends a water sampling during the feasibility study. However, the team recommends a more frequent sampling, not only during the design phase but during operation. During the visit to the communities, water samples were taken from two communities. In one community, a bacteriological sample and a physico-chemical sample were taken; in the other community, only a physico-chemical sample was taken.

Concern has been expressed by CRS and the project holders about the impossibility of conducting some water analyses. However, the evaluation team believes that equipment is available to conduct most of the analyses required. Field equipment is available on the market to measure pH, temperature, conductivity, turbidity. Test strips are available for semi-quantitative determinations. The test is performed by dipping the test zone of a strip in the water sample and comparing the results with a color scale. The strips are particularly useful for testing for nitrates, nitrites, sulfates, iron, ammonia, copper, and hydrogen. Also available are color disc test kits for testing for chlorine, nitrate, ammonia, pH, iron, chromium, cyanide, and phosphate. The color disc kits can be used easily in the field and will give more accurate results than test strips but are more expensive to buy and operate.

During the evaluation, water was either observed or reported to contain soil, debris, floating matter, crickets, etc. This condition is likely to prevent its usage and it is a threat to the health of consumers especially since most communities do not boil their water.

Lack of boiling of water is a serious problem in rural Honduras. A study done by the Health Ministry showed that after a radio message about boiling water to prevent diarrhea reached nearly 100 percent of the rural population, only 1.8 percent followed this advice. Twenty percent of the families studied believe that during boiling, water loses "vitamins and power;" 70 percent do not boil water because it takes extra time and effort or because they do not want water to lose its taste.

The diarrhea situation in Honduras is of concern. It is estimated that 2,000,000 cases of diarrhea per year occur in the age group 5 years or less. Each child incurs 2 to 5 episodes per year with an average of 3. The morbidity rate during 1983 was 219.4 per thousand children (five years or younger). Diarrhea is the leading killer of children one year old or younger.

<u>Water Quantity</u>. One of the major benefits of these water supply projects is that the distance between the community and the water tap has been greatly reduced. Water availability has also improved; however, still more work is needed. Of the eight communities visited, two have a water shortage problem all year round and two have this problem during the dry period. However, these four communities were aware of that fact, in advance of the project.

During the dry period, water from the new system is used only for drinking and cooking purposes; additional amounts are obtained from the old source.

Water flow measurement is conducted at different times. In the case of Intibuca, the "Delegado de la Palabra" (church representative in the village) measures the flow twice during both the dry period and the rainy season. Only in case of doubt does the engineer measure it. The time-volume method is generally used.

4.1.2 Source Protection

Most of the communities visited have their water supply source located well above and distant from the community. This might be considered a good source protection since it minimizes the potential for contamination from human wastes. Forestation in the proximity of the water intake is being done to prevent the use of the watershed for raising livestock. Hence animal defecation, a potential source of pollution, is reduced.

La Jagua and La Criba water supply sources are close to the communities. A high potential for groundwater pollution from the surface exists. Las Flores has a deep groundwater well and the sanitary seal seems to be well installed, so groundwater pollution potential from surface sources may be nil.

Intake structure location is generally adequate; no potential for seasonal flooding and contamination of the intakes exists. Drainage ditches upstream of the intake were provided to intercept and divert surface runoff. Those communities with a flooding potential of their water intakes are Las Casitas, La Criba, and Llano Grande.

4.1.3 Design Criteria

For the most part CRS uses SANAA design standards, with a few deviations. However, these design standards may need to be changed to reflect CRS's funding approach. In the next paragraphs, discussion of some of the design parameters is presented:

- Source Requirements. SANAA recommends that the water supply source have a minimum capacity equal to or greater than the design maximum day demand, but never less than 16.0 gallons per minute (gpm). CRS has used water sources with a smaller capacity than this amount. CRS requires that the source be able to provide 15 gallons per capita per day (gpcd) or about 60 liters per person per day; if the source is inadequate, the water project is not constructed. However, if the need for water is critical, that is, if the water source is polluted, then the new source is still developed. Of all the communities visited, Las Casitas is the only one which requires more than 15.0 gpm.

- Per Capita Consumption. CRS attempts to provide 15 gpcd. In both cases, recommended water consumption factors do not take into account climate and socio-economic level of development. It is well known that a person living in a cold climate uses less water than a person living in a hot climate. Level of socio-economic development has also been proved to have an effect on the amount of water consumed.

- Population Projections. Water systems are designed for a future population. The design period recommended in the National Design Criteria is 20 years. A population census is conducted during the initial visit to the community. This information, in conjunction with the growth rate, is used to estimate the design population. Growth rates are estimated from the last two community censuses. The geometric method is used for the population projection.

- Design Period. The design period may be too long. By using a 20-year design period, the system is being designed to supply water to a non-existent population, which amounts to about 60 percent of the actual population. This increases the cost of a project and prevents other communities from receiving the present benefits of a water supply system.

- Average Day Water Demand. This is estimated by multiplying the per capita consumption by the design population.

- Maximum Day Water Demand. CRS uses a maximum day factor of 1.35, which is the factor recommended by SANAA. The maximum day water demand is estimated by multiplying the average demand times the factor. This demand is used to determine the adequacy of the water source. This is also used to size the transmission line.

- Peak Hour Water Demand. SANAA uses a peak hour factor of 2.7. This factor is used to size the distribution system. The distribution systems used are the branch type; no looped systems were reported in any of the communities.

- Storage Requirements. CRS designs for a storage capacity of 100 percent of the average daily use, while SANAA recommends a storage capacity of 15 percent to 25 percent of the maximum daily consumption. It appears that, in general, CRS is overdesigning the storage capacity. On the other hand, in at least one community with a water shortage problem, water overflows the tank during the night--indicating an inadequate design.

- Hydraulic Design. Darcy-Weisbach and Hazen-Williams equations are used by CRS for the design of the transmission line and the distribution system. pressure break chambers are used when static pressure gets above 100 meters. A maximum recommended pressure is not established by SANAA. Water hammer is considered when water velocity is high.

- System Design. All of the water systems constructed with matching grant funds are gravity flow, except the solar pump system at Las Flores. They are of a very simple design and work by themselves without the need for an operator. Gate valves are the only control those systems have. Design has been improving; first design of the intake structure called for heavy hatch covers which could only be lifted by four persons, but a later design calls for light covers.

- Minimum Pressure. Minimum recommended pressure is 10 meters. In general, this pressure is met. However, in a few projects pressures of less than 1.0 meter were experienced where some houses were above the hydraulic gradeline -- which prevented them from enjoying a continuous water service. In some other homes, water taps were located far from the house to be within the zone of satisfactory pressure.

  Most of the time, pressure problems were caused by the low elevation of the water source relative to the community.

- Appurtenances. Air relief valves are recommended to be installed in high points. Several complaints on air accumulation in pipelines were reported to the evaluation team. This prevented some households from receiving a constant supply of water.

  Drain valves are recommended at low points in the transmission line. They are used to flush out the solids accumulated in the line. None of the projects visited have these devices. It may be possible that pipelines have a water velocity greater than the scouring one. The team was unable to verify that -- however, periodic flushing of the lines is still needed.

  Storage tanks were not provided with bypass capabilities. Therefore, water service is cut off when maintenance of the storage tank is being provided.

- Sanitation Systems. Honduran communities do not feel an urgent need for a sanitation system, as they do for a water project. That is the reason why CRS contracted

EDUCSA to educate the community on the need for a latrine program.

There is no sanitation component in this program. The health education component includes efforts to build awareness and understanding and to encourage communities to request, install, and use latrines. Some communities have a few latrines, but many do not have any. All houses at La Jagua and Las Flores had latrines. These latrines were supplied by the Health Ministry. In general, latrines found were the conventional ones; water seal latrines are used in Las Flores.

4.2 Materials and Methods of Construction

Most of the materials used in the construction of water projects are bought in Tegucigalpa City. PVC pipe, fittings, and glue are manufactured in Honduras. (Locally-made galvanized pipe is of bad quality, so Japanese galvanized pipe is used but is expensive.) Cement is also a Honduran product. Sand, stone, and wood are provided by the community and are local materials. Bronze faucets and gate valves are imported. Slip-joint PVC pipe is used for diameters 4 inches and larger. Solvent-welded PVC pipe is used for smaller sizes.

The solar pump system installed in Las Flores is not meeting the water demands. This is due to two factors. First, the solar panels do not provide enough energy to drive the pump during cloudy days. Even a single cloud is enough to reduce energy production and consequently stop the pump. Second, the capacity of the pump may not be large enough, even during sunny days. The pump falls short of meeting the water demand. The community has returned to its original water supply source to get the additional amount of water needed. Bathing is now practiced in the old water supply source. The community is not satisfied with present conditions.

Pipe joint separation is a problem in several communities visited. This may be due, in conjunction with other factors, to the pipe installation practices. PVC pipes are laid during the heat of the day and they are naturally in a slightly elongated state. Cooling of the pipes during the night causes them to contract in length, therefore causing bursts at the solvent cement joints when the spigot pulls out of the socket.

Methods of construction are generally adequate. Heavy construction equipment is not used; rather picks and shovels and a few tools such as pipe cutters and pipe wrenches are utilized.

During the first projects executed with these matching grant funds, supervision during construction appeared to be a significant weakness. Communities cannot be left working by themselves because, as observed by the team, (1) the quality of work deteriorates and (2) construction time extends over a long period of time.

During the last projects in Camasca, a mason was hired by CRS to supervise and help the community construct the intake structure and the storage tank. Moreover, a person was selected, among the members of the community, to be in charge of the project. The community does the trench and the installation of the pipeline. The mason trains them in the installation of gate valves. This seems to have better results.

The mason visits the community several times during the project and usually stays from 3 to 5 days. His first visit is during the construction of the water intake, the second visit is during the construction of the storage tank, the third visit is during the installation of the pipelines, and then during the installation of the patio connections. He is in charge of several communities.

Chlorination of intakes, storage tanks, and distribution systems and pressure tests in pipelines prior to use of the system are not practiced. The team believes that many pipe joint separations and many community headaches would be avoided by conducting these simple practices.

4.3 Management

In general, CRS has an effective management plan for the implementation of the water supply projects. A typical CRS project involves one supervisor engineer, one surveying crew, one draftsman, one field supervisor, and one health educator. The engineer is in charge of the technical aspects, the surveying crew conducts the surveying work needed, the field supervisor is in charge of the training of the community on the water project, and the health educator is in charge of the social and health aspects. A typical project lasts three months. The engineer visits the project once a month, the field supervisor spends a good deal of time in the community, and the health educator visits the project once a month.

Materials acquisition is made in Tegucigalpa or San Pedro Sula. There is good coordination between project holders and communities on the delivery of materials. Shipping of materials takes from one to two weeks. During this time the water committee is trained on storage of materials and record keeping. Arrangements are made for the safe storage of materials. At the same time, the future water operators receive their first lessons on pipe fittings and valves.

4.4 Financing and Economic Aspects

CRS requires the community to pay for part of the project. About 37 percent of the total cost is paid by the community. This includes the cost of labor, local materials, and cash. The cash amounts to 5 percent of the cost of materials and this amount covers the transportation costs. This amount has varied from Lmp 200 to Lmp 2,000 (about $100 to $1,000).

The feasibility study is covered in part by CRS and the other part by the community. Part of the per diem and the salary of the surveyor and his assistant are paid by the community.

An effective use of the financial resources available has been made. This can be seen when comparing CRS average per capita total cost for the water systems with published government figures. The former is $53.50 and the later is $54.00.

Most of the communities visited pay for the O&M cost. With the aid of CRS, communities have set the water rates. Table D-2 shows the water rates paid in the communities visited.

From those costs presented in Table D-2, it is possible to make some interesting comments. For example, to replace or install 100 feet of 1-1/2 inch PVC pipe, Sta. Catarina will spend an amount equivalent to 11.2 months of collected water fees and Llano Grande will spend 6.8 months. Are the water rates adequate? The team believes that the water rates are not adequate. Moreover, the team believes that it is necessary that the existing water systems generate the revenue necessary for the O&M and future expansion costs.

Table D-2

COMMUNITY WATER RATES

Community Name	Cost/person (Lmp/month)	Total Collected Monthly(Lmp)
Las Casitas	not yet set	
La Jagua	1.00	26.00
La Criba	1.00	19.00
Agua Sarca	0.50	--
Sta. Catarina	0.25	8.50
Llano Grande	0.50	14.00

Chapter 5

SYSTEM OPERATIONS AND MAINTENANCE

5.1 Introduction

The weakest part of any rural water supply program is the O&M program. This is due to several reasons. First, an insufficient number of trained personnel exist -- causing broken water system equipment to lie in disrepair soon after construction. More skilled and semi-skilled technicians who can carry out simple repair and maintenance work are required. Another reason is timing of training. Training should start during the construction period, so water operators can see the water system being built and be ready to operate it when construction is completed. In many cases, at least one person must be retained on the job during the first year of operations to continue the training and to supervise operations.

5.2 Organizational Aspects

The first requirement, before a community is selected for a water project, is that a water committee be elected. The community must elect each member of the water committee. The water committee will be in charge of the construction and, later, of the operations and maintenance of the system. They also will collect fees and schedule community members for the maintenance of the facilities.

Community meetings are regularly held, first during planning, later during construction, and much later during the operation of the projects. During the last phase, monthly meetings are held. Community members are obligated to attend these meetings. In case of absence, one must present in written form the reasons for not attending the meeting.

CRS has developed a set of regulations for the management, operation, and maintenance of the water project which each member of the community is obligated to meet.

The maintenance of the system is carried out by all the members of the community, sometimes with the help of the water operators. The actual operations and repairs are performed by the operators. These operators are selected from among the members of the community and usually number from two to four. The operators must be young, literate, and, if possible, members of the water committee. They are selected at the start of the project and trained during the construction.

The team found the operators to be knowledgeable on the operations and maintenance of the water system. In several instances, they had already fixed broken pipes, without any difficulty.

5.3 Operational Status

Limited information is available from a system that has been in operation for a short period of time. Communities visited had been operating at the most for three years. There were several recently completed ones. Still the team learned some of the operational problems, especially those related to water quantity, water quality, system reliability, and logistics.

In Table D-3, the operational status of the systems visited (in regard to water quality and quantity) is presented.

From this table it can be observed that water quality, in some communities, is marginal. At the time of this writing, bacteriological information from a water sample taken during the evaluation had not been received.

Water systems are supplying, in general, adequate amounts of water. Several communities reported water shortages, but that is a function of the source, not an operational problem.

As a result of water availability, water consumption has increased to the point that children appear to be cleaner and have more hygienic living conditions.

System reliability is adequate when the system provides water to the consumer on a continuous basis. In rural systems, because of existing economic conditions, this requirement is not as stringent. However, a rural system must minimize the number of times the system is down because of repairs. Information on the frequency of repairs was obtained from each community visited and is presented in Table D-4.

Several communities reported problems with air accumulating in the distribution system. This can cause unreliable system operation. Another problem is the lack of a bypass in the storage tank. The community is then forced to be without water during the tank maintenance.

Inadequate drainage around taps was observed in some communities. Puddles are formed, which create potential mosquito breeding sites. This may have a detrimental effect on the health of villagers. In rural Honduras, 15.4 percent of all water-related and non-water-related diseases are malaria cases. This disease has a very high economic impact on rural areas because an infected villager needs about three months to fully recover.

Systems visited did not have a maintenance program for chlorination of water intakes, storage tanks, and distribution lines after construction nor for periodic flushing of lines.

Communities visited usually have an adequate stock of materials for the operation and maintenance of the system. Several lengths of pipe of each size, type, and material are left. Water faucets and some pipe fittings are also left. Gate valves, glue, and washers are not left.

Latrine maintenance is usually taught by health educators. Use of ash, lime, or "Nixtamal" water is recommended to prevent odors. Toilet covers are also recommended to prevent proliferation of mosquitoes and flies.

Table D-3

OPERATIONAL STATUS OF
SYSTEMS VISITED

Name of Community	Month/Year Completed	Water Quality	Water Quantity
Las Casitas	05/86	cl,b,s	shortage
La Jagua	05/86	cl	adequate
La Criba	---	tu,cr	shortage
Agua Sarca	04/86	cl,cr	adequate
San Isidro	10/86	cl	shortage
Sta. Catarina	---	cl,s,b	shortage
Llano Grande	10/86	cl,fr	adequate
Las Flores	--/84	cl	shortage

cl = clear
tu = turbid
b = floating debris
cr = cricket
s = sediment
fr = frog and frog larvae

Table D-4

Reliability of Systems Visited

Community	Number or Frequency of Repairs
Las Casitas	several
La Jagua	once
La Criba	none
Agua Sarca	once a month
San Isidro	3 times
Sta. Catarina	none
Llano Grande	none
Las Flores	none

5.4 Constraints

Locations of most of the water intakes are far from communities and up in the mountains. Because of that, maintenance may be impeded. However, all of the communities visited seemed to have taken good care of the water intakes. Heavy hatch covers were observed in the first designs -- four men were needed to lift one. Fortunately, later designs have light covers that can be lifted by one person. Therefore, periodic inspections will not be discouraged.

Chapter 6

HUMAN RESOURCES DEVELOPMENT

6.1 Personnel Selection

CRS did not directly participate in personnel selection except for the mason in Intibuca, who is both conscientious and competent.

6.2 Training

The CRS engineer (and, in the case of Intibuca, the master mason also) provides technical training on how to construct, maintain, and repair the system. This training has been practical, on-the-job, and particularly effective in that the entire community has learned construction and maintenance techniques, eliminating the need for a specific maintenance man.

During 1986, EDUCSA promoters also provided training in health education in many of the communities. We found the promoters to be very conscientious and well accepted. They are supported by an organization that produces audio-visual materials and provides adequate supervision and support. When they were able to work with teachers and students and with men in the community, and with women's groups, they appear to have had considerable success in implanting the sanitation and health education ideas in the community.

In those cases where the EDUCSA promoter had begun early in the planning and implementation process, community members evidenced an understanding of basic health and sanitation principles.

At the same time, however, other training and promotion activities were being accomplished and there was very little attempt to coordinate these different activities. In Choluteca, a church program supported the training of 28 health promoters a year (four sessions of 15 days each), followed by some supervision in the field by trained nuns. In the course in progress during the consultant team's visit, one student was from a village which had been approved for a CRS water project. He was not aware, however, of how this project would fit in with his other activities as a health promoter in his village.

In Camasca, Intibuca, the church also has a training school which trains villagers in diverse technical and health-related skills. There is a need to combine this program with activities of the EDUCSA promoter and the training which is accomplished by the government-run health clinic in Camasca.

When the community had an organizational base and leadership, either closely connected to the church or capable of dealing with outside agencies, the amount of training and support for community activities was significant. When this was not the case, much depended on the EDUCSA promoter's ability to provide training in the community and connect it with other resources.

One of the serious problems in the technical training area is the remoteness of the villages and the single engineer which CRS has to cover all projects in the country. In Intibuca, CRS hired a master mason to assist the engineer in the technical training and supervision of the construction and installation of the water systems. This has significantly improved the training and supervision efforts in that area.

The evaluation team's observations and interviews indicate that the effectiveness of the training aspects of the project depend significantly on the receptivity of the community, its organizational capacity, and the ability of the outside staff to visit and incorporate the villages into a meaningful training program.

Chapter 7

HEALTH, SANITATION, AND WATER USE EDUCATION

7.1 Community Health Education Approach

CRS decided to reinforce the health education activities of the Catholic organizations with its own targeted health education program. It therefore made an initial one year contract with EDUCSA to assign promoters to each of the villages selected for CRS water projects during 1986. CRS is presently reviewing this activity to determine if it will renew the contract and if so, how to obtain the funds.

The evaluation team's observations confirm that Caritas and parish staffs have a large number of villages in which they wish to carry out both religious and development activities. Supporting them with specifically targeted health education efforts on CRS projects is a sound strategy for using the water projects to initiate or reinforce health education in these remote and underserved communities.

The strategy assumes that health education is a long-term process. Therefore, intensive effort during the project will not only give impetus to the process, but lay the basis for communities to take better advantage of the government, Caritas, and parish resources once the project is complete. EDUCSA staff also pointed out the importance of follow-up activities to ensure that the community builds on the base which has been created.

The requirements of such a strategy are that selection of communities for water projects include criteria on:

- their receptivity to health education,
- their potential capacity for obtaining assistance,
- proper coordination to prevent duplication of effort, and
- linking the community with resources when the project is completed.

7.2 Criteria Established

The evaluation team found that CRS did not establish criteria that included health education in its agreements with the communities. However, the survey that is required before approval of the project did include information on which a health education program could be based.

The 1986 contract with EDUCSA recognized the need for both a strategy and criteria. EDUCSA promoters participate in the initial survey and have developed criteria for their interventions, as well as for material for activities. Since their contract is for one year, they are now reviewing their efforts in order to make more specific proposals to CRS.

7.3 Coordination with Construction and Maintenance

In general, an EDUCSA promoter is assigned to a village as soon as a decision is made that CRS will support its water project. However, the evaluation team found villages to which promoters had not been assigned even though they had completed water systems (e.g., San Isidro and Llanos). It is not clear whether there is need for additional staff, greater coordination with other communities, or if more effort to train local promoters would reduce the workload of the EDUCSA promoters. This is a matter which requires attention if the contract with EDUCSA is renewed.

7.4 Materials

We found that EDUCSA promoters conduct surveys and develop procedures for their interventions. They become well liked, and community members report that they make an important contribution to community activities. Promoters use audiovisual materials developed by EDUCSA for both water use and overall sanitation. However, no posters or other visuals were seen in the villages visited.

EDUCSA promoters make regular visits to the community, provide information on water and health, and work with the community in the appropriate use of the water system to improve community sanitation and health. They have been provided with motorcycles to facilitate their travel. Community interviews confirm they completed their regular, planned visits.

Efforts are made to promote latrines in the communities. The degree of acceptance of the concept varied with the education and the previous efforts which had been made in the area. At a minimum, the promoters were able to generate interest within the leadership of the community and make important inroads into total community awareness. They were also able to connect the community with the resources that could provide latrines.

Communities were in different stages of a latrine program. A few had installed them and most families were completing the construction of the houses. Most communities were either planning to initiate a latrine program or had begun some efforts in this area. Awareness had clearly increased, but knowledge of the importance of total latrinization of communities was mixed.

As pointed out in the training section, there is a need for more coordination. In Choluteca neither the EDUCSA promoter nor his supervisor was acquainted with the supervisor of Caritas promoters, and they did not coordinate their activities. In Intibuca an effective, informal coordination takes place between the church promoter and the EDUCSA promoter. EDUCSA is aware of this problem and used the evaluation team's visit to initiate more active coordination.

EDUCSA has made an effort to improve the quality of materials used, but they have a one-year contract; no decision about renewal has been made. No posters were observed in any village although EDUCSA has used audiovisual materials in their training, drawing on their own work and that of other government water programs.

7.5 Funding Allocation

The total cost of the health education activities is less than 10 percent of the project funding and may not be adequate for the needs of the project. This question should be reviewed to determine if a more coordinated strategy with Caritas and the local parishes will provide more effective health education. If not, funding for this portion of the program should be increased.

7.6 Constraints

The major constraints in Honduras are basically no different than in the other countries visited: accessibility of communities; the need for a long-term approach to organization and health education which was not envisioned by the project; the tendency for both the community and the external assistance to concentrate on water availability rather than long-term benefits; and the need for pre-implementation efforts in health education to take maximum advantage of community interest.

Chapter 8

ADMINISTRATION AND MANAGEMENT

8.1 Institutional Arrangements

The arrangements between CRS, EDUCSA, and the diverse Catholic agencies appear to be working well. Such difficulties as arise are normally the result of the limited staff available. We found that CRS did not incorporate some institutional training that could be helpful. EDUCSA did not take best advantage of the volume of health education material which has been prepared in the country.

8.2 Coordination

At the national level there appears to be little coordination with USAID or other agencies involved in rural development (e.g., Ministry of Health, SANAA, or Save the Children Federation). During the evaluation team's visit, USAID evidenced more interest in the projects and in the possibility of providing support for additional activities and follow-up on present projects.

A significant problem is the need to coordinate activities in the field with the available government organizations, and the Caritas and parish activities to determine how selection, early implementation, and follow-up can be incorporated into the present strategy.

8.3 Current Funding Status

CRS-Honduras reports that while approximately $50,000 of the total allocation for the program remains, they presently have pending requests in New York for more than $100,000 in new projects. The CRS representative states that while there were initial problems in locating adequate projects and some inertia in implementation, the program now has a good reputation and the requests far outnumber the funds available for implementation.

CRS-Honduras is concerned about the financing for continuing the program. The evaluation team's visit provided the opportunity to better inform the USAID Mission about the progress and potential of the program. The mission now appears to be interested in financing similar programs.

8.4 Information Systems and Monitoring

Since CRS is directly involved in the water projects, much of the monitoring is done in the field by the CRS engineer and mason. Communities are required to provide reports every six months on the financial and operational situation of the project.

Similarly, the EDUCSA promoter is in regular informal contact with the supervisor. The proximity and road conditions make it possible for the Choluteca promoter to spend some time each week in Tegucigalpa consulting on materials, receiving supervision, and informing the organization on the progress of the work.

Intibuca is more remote, but the supervisor appeared well informed on the activities and took advantage of the evaluation team's visit to review with each of the promoters the progress in their work, and develop recommendations for future proposals to CRS.

Direct monitoring of progress on the projects therefore appears to be informal and adequate. Scheduling must also vary with the season of the year and it appears that there has been little problem of delay in materials arrival or their use by the community.

8.5 Inventories

CRS buys construction materials as needed. This practice has been expeditious in the shipping of materials to the project site. Materials are acquired in Tegucigalpa or San Pedro Sula and are shipped to the project site in a period of one to two weeks. Wholesale prices may not be obtained but lower costs in handling and storing materials are gained. Due to the size of the construction activity, the team believes this procedure is the most economical.

Chapter 9

PROJECT EFFECTS

The most obvious effect was the provision of water to small remote communities which had not had such immediate access previously. People appreciated the results and had increased their usage for cooking, laundry, bathing, and drinking. Children, patios, and people were cleaner; women had more time to engage in other activities, and some of these activities were economically productive (gardens, handicrafts, etc.).

Villagers developed confidence in their ability to accomplish community-determined objectives. The dedicated efforts of community members and outsiders working together resulted in a specific payoff. This has created a willingness on the part of both groups to undertake other projects.

Organizational capacity was increased in most cases. In the most successful communities, additional groups had been formed, new leadership had emerged, and new activities had begun. In many communities, old organizations were becoming more active and plans were made or action begun to undertake other community priorities. In the least successful communities, increased potential for organizational development existed even in cases where the water project had created internal conflicts. In one case, action by the community was already being taken to resolve conflicts.

Participation was increased in communities. At a minimum, everyone involved in the project provided work or support to the construction and installation of the water system. In many communities more people were involved in active participation in specific projects for the community instead of simply attending meetings of the whole community. In some cases participation had increased to the point where more community coordination was necessary.

Increased knowledge of health practices varied greatly. Receptivity to health education was increased in almost all communities. In many cases there was evidence of some gradual change in attitudes because of project efforts and the acceptance by community leadership of new ideas. In a few communities characterized by a higher level of education and continuing efforts generated by the project, specific changes in behavior were noted.

CRS became more aware of the difficulties of dealing with remote communities and the problems of coordinating actions with other rural development groups. They also learned about the capacity of communities to organize for priority objectives, the importance of ongoing action, and the good will that can be generated by such projects. CRS staff and others associated with the project expressed strong interest in continuing these activities.

Acceptance of responsibility by the community for its problems is an intangible but important element that could be seen in some communities. More frequent was the recognition that organization and community analysis of its problems was the key to obtaining the outside assistance that was necessary.

Some unintended effects were the emergence of conflict situations which will now require much effort to resolve. These issues, if properly dealt with, will improve community unity and capacity. Proliferation of activities and fragmenting of interest groups have occurred in a few cases, either due to lack of community priority-setting or to lack of coordination. This too provides a challenge to the communities and may require some additional assistance in community organization.

Chapter 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 Project Development

10.1.1 Conclusions

1. CRS-Honduras' approach takes advantage of the dynamic and development-oriented Catholic church organizations in priority areas to select community project requests which will directly assist in the planning and implementation of water projects. However, this approach requires more staff than CRS has presently provided.

2. The approach allows for central control of the quality of the systems, but it requires contracting for health education services with a local PVO (EDUCSA) and in one case the hiring of a local master mason to assist in the construction and training effort.

3. Catholic agencies have their own development programs which reinforce CRS water programs. However, the remoteness of the communities and the difficulties of transportation and communication greatly complicate the monitoring and supervision aspect.

10.1.2 Recommendations

1. CRS should develop clearly articulated strategies together with church agencies, which will clarify their expectations for water projects, For example, the following alternatives might be considered:

   a. Water projects as entry points for the introduction of community organization skills, health awareness, and education. This means selecting the most needy and least organized communities and training them in organization and health through the water program. Initial efforts to build capability, confidence, and awareness where little has existed will provide a long-term basis for community development. The water program can be used as a reward for organizational capacity. (Caritas is a modest approximation of this approach.)

   b. Alternately, CRS can use the water projects as a practical means of supporting and broadening existing strengths in a community by selecting communities with organizational capacity and using the water projects to broaden health awareness and education and generate new initiatives. Such projects encourage responsibility and facilitate other support assistance. Ultimately, the community deals with its own problems and obtains additional assistance. (Santa Catarina is a successful example which is now fully ready for a latrine project.)

Either of these approaches or a mix of them requires some more specific selection criteria and impinges on all of the other recommendations below.

2. CRS needs to consider what its approach requires in terms of the number and distribution of staff.

10.2 Community Selection and Participation

10.2.1 Conclusions

1. Basic selection criteria were generally followed. The Caritas promoter in Choluteca and Father Celso Sanchez in Camasca have been conscientious in the selection and support of the projects. We found the acceptance of the church promoters by the community to be an important factor in both planning and implementation. They also have the potential for conducting follow-up activities, which will be critical to the long-term success of the program.

2. In some problem communities factionalism and problems of insufficient coverage may have been caused by conflict generated by the water project or by pre-existing organization and participation problems overlooked by the parish which proposed the project.

3. Organizational development varied with the level of education, initial capacity of the community, and the frequency of training and supervision provided. In the most successful communities the level of organizational improvement was high.

4. The degree of involvement of different interest groups (particularly women) in the community evidenced by new activities was a significant factor. The entire community is interested in the water project, but participation in other activities (organizational, educational, schools, women's clubs, etc.) is directly related to organizational development and understanding of water use and health.

5. Community leadership is important in a very specific way. Many projects had strong, sometimes even dominating initial leadership. However, successful projects show a progressive sharing of power and the introduction of different people to direct important and often new activities. Two particularly successful projects now need more coordination of diverse activities and a more integrated relationship with the entire community.

10.2.2 Recommendations

1. Special attention should be given to existing community organization when establishing the feasibility of the project.

2. Communities should be encouraged to increase participation by creating more interest groups to take over responsibilities for diverse activities in the community. In particular, the involvement of women should be encouraged.

3. CRS should only pay for the cost of water systems with public standpipes and let the community pay for the difference in cost if they desire patio connections.

10.3 System Design and Construction

10.3.1 Conclusions

1. CRS uses national design standards. However, these design standards may need to be modified to reflect CRS's funding approach. For example, some modifications are needed in the water consumption factor, in the design period, and in the storage capacity.

2. The SANAA requirement to provide 16.0 gallons per minute (gpm) is not applicable to the size of communities in Honduras; the amount of water these communities demand is generally less than 10.0 gpm.

3. The use of air relief and drain valves is critical for the correct operation of the water systems.

4. Water quality of projects is better than from old sources, but still falls short of minimum water quality standards. Checking the water quality of sources is not conducted in all projects. However, SANAA recommends a water sampling program.

5. Water availability has been greatly improved with the construction of the water projects. However, quantities of water available for two of the communities are not sufficient. These communities were aware of that fact in advance.

6. The water supply systems were of a very simple design. Except for the solar pump system at Las Flores, gravity flow systems are used; they work by themselves without need of an operator. Gate valves are the only control these systems have. Storage tanks have not been designed to allow for water to be bypassed during tank maintenance; this is a shortfall which must be corrected. Gate valves are installed in each main branch. Because of that, reliability of the system to provide water is adequate.

7. Intake structures, storage tanks, river crossings, and patio connections are in general well constructed. In a few cases, inadequate river crossings and exposed PVC pipes were observed.

8. Pipe joint separation is a problem in several of the communities visited. This may be due, in conjunction with other factors, to the pipe installation practices.

9. Water quality control is not practiced. Neither chlorination of intakes, storage tanks, and distribution systems nor pressure tests are conducted prior to use.

10. Supervision during construction appears to be a significant weakness. Communities cannot be left working by themselves because (a) the quality of work deteriorates, and (b) the construction of the projects extends over a longer period of time. Most of the low quality work observed in the projects is because of this condition.

11. Minimum recommended pressure is 10 meters. In general this pressure is met; however, a few projects work with water pressures of less than 1.0 meter or do not supply water to higher areas.

12. The solar pump is not supplying adequate amounts of water.

13. There is no sanitation component in this program. The health education component includes efforts to build awareness and understanding and to encourage communities to request, install, and use latrines.

14. CRS has an effective management plan for the implementation of water supply projects.

10.3.2 Recommendations

1. CRS should, if possible, develop its own design standards to better reflect CRS's funding approach. CRS should analyze and correct, if deemed necessary, the design period and the water consumption factors. None of these steps involve complicated problems and could be easily undertaken on either an in-house or a contract basis. Water meters could be installed at storage tanks in those water systems built by CRS which are experiencing no water-shortage problems, to have a better consumption factor for the design of future water systems.

2. Air relief valves and drain valves should be used in high and low points, respectively. Alternate designs, like water faucets or pressure break boxes, should be considered.

3. Water quality of springs should be checked during both dry and rainy seasons, not only during the design phase, but during construction and operation. During operation, water should be tested at the source and at the tap. Bacteriological and aesthetic quality should be the main concern. Physico-chemical tests should be undertaken less frequently, perhaps once a year.

4. Simple water analysis kits should be acquired. This should be included in the budget, along with the cost of collection and analysis of samples during the operation of the system.

5. Slow filtration is recommended where bacteriological quality does not meet the recommended limits (10 coliform/100 ml).

6. Additional simple designs should be investigated. Experiences from Guatemala and Dominican Republic should be integrated into the program in Honduras.

7. PVC pipe exposure to sunlight and to external loads should be minimized. Pipe in river crossings should be protected by using galvanized casing. Pipe laid on rocks should not be left uncovered. A mixture of cement and soil or galvanized pipe casing should be used.

8. Quality control should be enhanced. Chlorination to clean pipelines, storage tanks, and intake boxes should be practiced. Pressure tests in distribution systems should be conducted. National standards or American Society of Testing and Materials (ASTM) standards should be used to determine maximum pressure and allowed leakage.

9. CRS supervision during construction should be increased. Engineers should have a specific schedule for visits and be available to project supervisors or local people, as required. A community counterpart to the project supervisor should be chosen from the members of the committee; the community representative needs to be trained to fully understand the whole project. In the absence of the project supervisor, this person would be able to make decisions. (In some cases, committee presidents now take this role.)

10. Storage capacity provided should be reviewed. Liquid level storage tanks may be studied during maximum consumption to determine if present design procedure is adequate. This could be done in several communities.

11. The sanitation component should be provided to those communities which have benefited from this program. Selection of latrines should consider all physical constraints, such as water availability, depth to groundwater, etc.

12. More attention should be given to detailed design and to collection of information needed for latrine design such as flood data, bedrock depth, etc.

13. Use of solar pumps should be carefully studied to fit local conditions, and other alternative technologies, such as wind electrical generators, should be studied.

14. Pipe joint separation should be investigated. New procedures on pipe laying must be studied. Pipe also should be laid at different hours of the day to see if this has an effect on the separation problem.

10.4 System Operations and Maintenance

10.4.1 Conclusions

1. Water system operators appear to be knowledgeable on the operations and maintenance of the water systems. In several instances, they have already fixed broken pipes. In only one community was poor maintenance of the tank observed.

2. The quality of water delivered to the customer, in some cases, is inadequate. In several instances, water in the water intake and in the storage tank was observed or reported to have soil, debris, floating matter, crickets, etc.

3. Inadequate drainage on taps was observed in some communities. Puddles are formed, which create potential mosquito or hookworm breeding sites. This may have a detrimental effect on the health of villagers. In rural Honduras, 15.4 percent of all water-related and non-water-related diseases are malaria cases.

4. The fee schedule for supporting O&M activities seems inadequate.

5. The stock of materials left for operations and maintenance is usually adequate. Only a few communities reported lack of specific pipe sizes. Glue and washers are the only materials not available. Storage of material is adequate.

6. There is no maintenance program for chlorination of water intakes, storage tanks, and distribution lines, nor for periodic flushing of lines.

10.4.2 Recommendations

1. Project holders should continue training members of the community in the construction and O&M of the system and on methods of obtaining better water quality.

2. Regular meetings should be held on O&M practices, not only within the communities but inter-community.

3. Water samples should be taken and analyzed regularly to monitor the condition of the system.

4. Provisions should be taken during the planning of the budget to ensure that a good stock of supplies is left in the community, especially glue and washers.

5. A study should be conducted to determine appropriate water rates.

6. Maintenance programs should include chlorination of storage tanks and flushing of lines. Flushing devices should be installed at dead ends; water velocity should be such that scouring will take place. A water faucet should be installed upstream of the gate valve in both the storage tank and the intake unit to help in the cleaning of these structures.

7. A simple O&M manual should be prepared and left in each community.

10.5 Human Resources Development

10.5.1 Conclusions

1. The quality and dedication of the different people working on the projects are high.

2. Training activities are well planned but implementation has suffered because of the isolation of the communities, the lack of good training materials, the delay in contracting EDUCSA, and the heavy load of work for the CRS engineer and the EDUCSA and parish staffs.

3. EDUCSA is making efforts to develop training materials and improve its coverage, but other training opportunities were not being utilized.

10.5.2 Recommendations

1. Technical, organizational, and water use training planning should begin at the time of the first visit of the engineer so that the information needed for project selection is available. The training should include these areas: (a) organizational; (2) technical (construction); and (c) health education.

2. Training should be planned by the community with the assistance of the engineer and the EDUCSA promoter. A community training plan should be a prerequisite for signing the agreement with the community.

3. CRS should take greater advantage of their use of local artisans to also train the communities in construction techniques.

4. EDUCSA should continue to obtain training materials. There are large resources of materials on water use and health education already available in the communities. There are also other agencies which are using new training approaches which EDUCSA could incorporate.

10.6 Health, Sanitation, and Water Use Education

10.6.1 Conclusions

1. Communities with reasonable initial organization, a moderate level of education, and conscientious efforts by the health promoter made significant progress in

the improvement of health knowledge and awareness and in instituting improvements in the community.

2. Communities which had functioning local health promoters made more progress than others.

3. Projects did not include latrine components although some communities were ready for them and capable of carrying them out.

4. Incorporating the schools and teachers in the water project provided special opportunities to advance health and sanitation objectives.

5. The available materials and training facilities for training in this area were not being incorporated into the projects.

10.6.2 Recommendations

1. CRS should request funds from the USAID mission for a latrine program in accordance with their expressed interest.

2. CRS should insist on communities selecting a local health promoter at the beginning of the project and incorporate them into the EDUCSA activities and other training opportunities.

3. CRS and EDUCSA should use schools for health education of both children and adults and as a repository of visual health information materials.

4. EDUCSA should work with other agencies to select appropriate materials and improve training methods.

10.7 <u>Administration and Management</u>

10.7.1 Conclusions

1. General management and reporting are adequate although the CRS engineer has difficulty because of the number and geographic dispersion of the projects.

2. Project information systems are not adequate for the needs of a program that is run from a central office.

3. Coordination with other agencies is limited but adequate for the project. The continuing and informal relations with the parishes are useful and important for effective information and management.

10.7.2 Recommendations

1. CRS should develop with EDUCSA and the parishes a simple and focused monitoring system that will track key indicators during the course of the project.

2. CRS should transfer many of the training and supervisory functions to the local level using the skills available. Local health promoters, artisans, and teachers can all contribute to the effectiveness of the project if training is incorporated.

3. Review meetings with EDUCSA, the parishes, and among communities can provide useful monitoring and formative evaluation.

10.8 Project Effects

Among the more obvious effects were the following:

1. Water was provided to communities that previously had no immediate access to acceptable water supplies. Not only was more water available and used, but more time is now available for activities other than hauling water.

2. Children and communities appeared to be cleaner.

3. There was a new confidence in community capacity to accomplish its objectives.

4. Organization, participation, and health knowledge increased in varying degrees in most cases.

5. CRS learned how difficult it is to implement projects in remote areas.

6. One unintended effect was the exacerbation of community conflict in two cases and the creation of water distribution problems when the entire community could not be served.

ANNEX 1

Honduras Projects
under the USAID/CRS Program

HONDURAS PROJECTS
UNDER THE USAID/CRS PROGRAM

	Name	Type	Total Cost	CRS Cost	PCTG.	Benef. Pres.	Benef. Design	T. Cost/ Capita
1.	Las Flores	SPH	$ 29,810.85	$ 20,216.61	67.82%	150	225	$198.74
2.	Los Jutes	EPH	19,128.77	6,904.20	36.09%	274	411	69.81
3.	Muyen Chinacla	GH	8,608.21	5,565.53	64.65%	185	278	46.53
4.	La Angostura I	IRR	6,039.74	5,289.00	87.57%	217	326	27.83
5.	La Lima	EPH	14,425.38	12,543.92	86.96%	342	513	42.18
6.	Bajo Aguan	HP	3,878.97	2,808.97	72.42%	280	420	13.85
7.	Agua Bl./Cort.	GH	11,544.61	4,178.93	36.20%	232	348	49.76
8.	Intibuca (6)	GH	52,681.74	34,637.98	65.75%	1,001	1,502	52.63
9.	La Jagua	GH	8,077.60	5,888.56	72.90%	153	230	52.79
10.	Muyen San Jose	GH	11,720.44	7,229.29	61.68%	291	437	40.28
11.	La Criba	GH	5,654.24	4,120.60	72.88%	196	294	28.85
12.	Las Casitas	GH	8,540.59	6,002.08	70.28%	199	299	42.92
13.	San Lorenzo	GH	11,901.00	8,575.00	72.05%	463	695	25.70
14.	La Angostura	GH	20,727.52	15,952.00	76.96%	419	629	49.47
15.	San Isidro	GH	23,180.00	17,662.00	76.19%	464	696	49.96
16.	Intibuca (8)	GH	108,940.00	75,586.00	69.38%	2,233	3,350	48.79
17.	Choluteca (10*)	GH	172,147.00	130,363.00	75.73%	3,258	4,887	52.84
18.	Cortes	GH	21,658.70	16,174.00	74.68%	874	1,398	24.78
	Sub Total		**$538,665.36**	**$379,697.67**	**70.49%**	**11,231**	**16,934**	**$47.96**
	EDUCSA		$ 39,418.00	$ 20,618.00	52.31%			
	Feasibility Studies		$ 14,662.50	$ 11,662.50	79.54%			
	GRAND TOTAL		**$592,745.86**	**$411,978.17**	**69.50%**			
	Averages		$ 29,925.85	$ 21,094.32	68.90%	624	941	$52.78

* Only $40,000 disbursed to date

Notes: E = Electric Pump
G = Gravity Connection
H = Household Connections
P = Public Standpipe
S = Solar Pump

ANNEX 2

Photographs

Photo 1. Water tap installed close to ground level due to low pressure - La Criba.

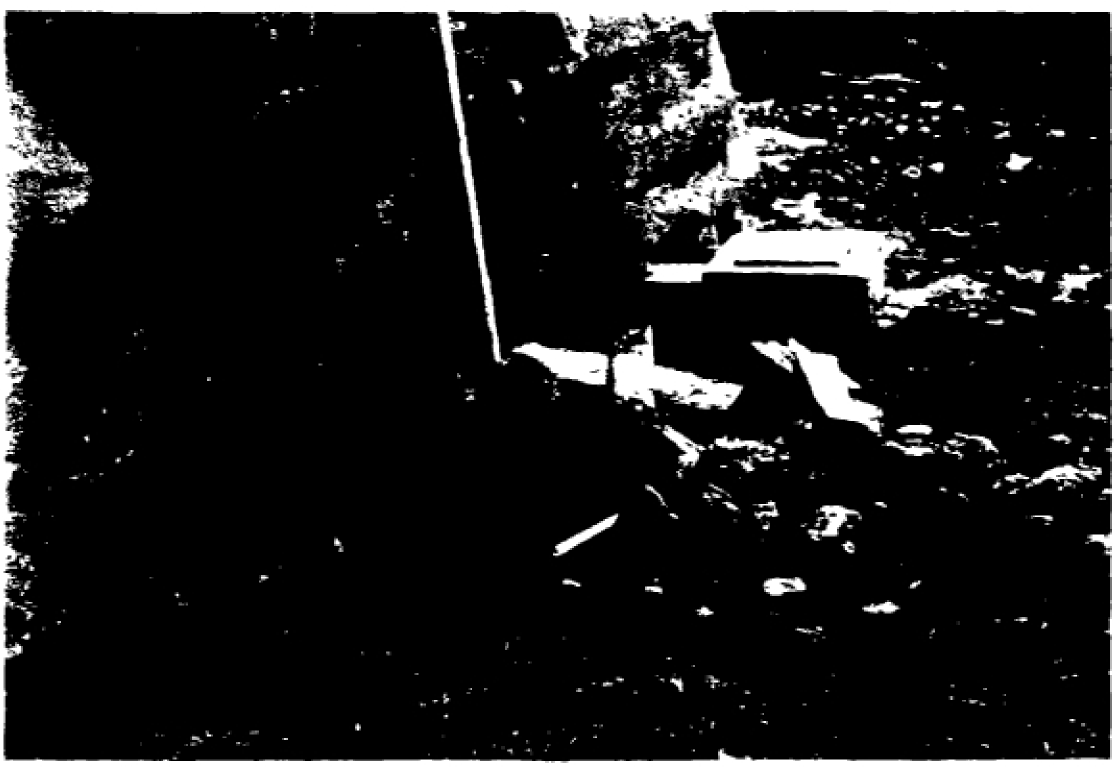

Photo 2. Incomplete construction due to lack of supervision - Casillas.

Photo 3. Improper pipe installation - Agua Sarca.

Photo 4. Inadequate elevated river crossing - Casillas.

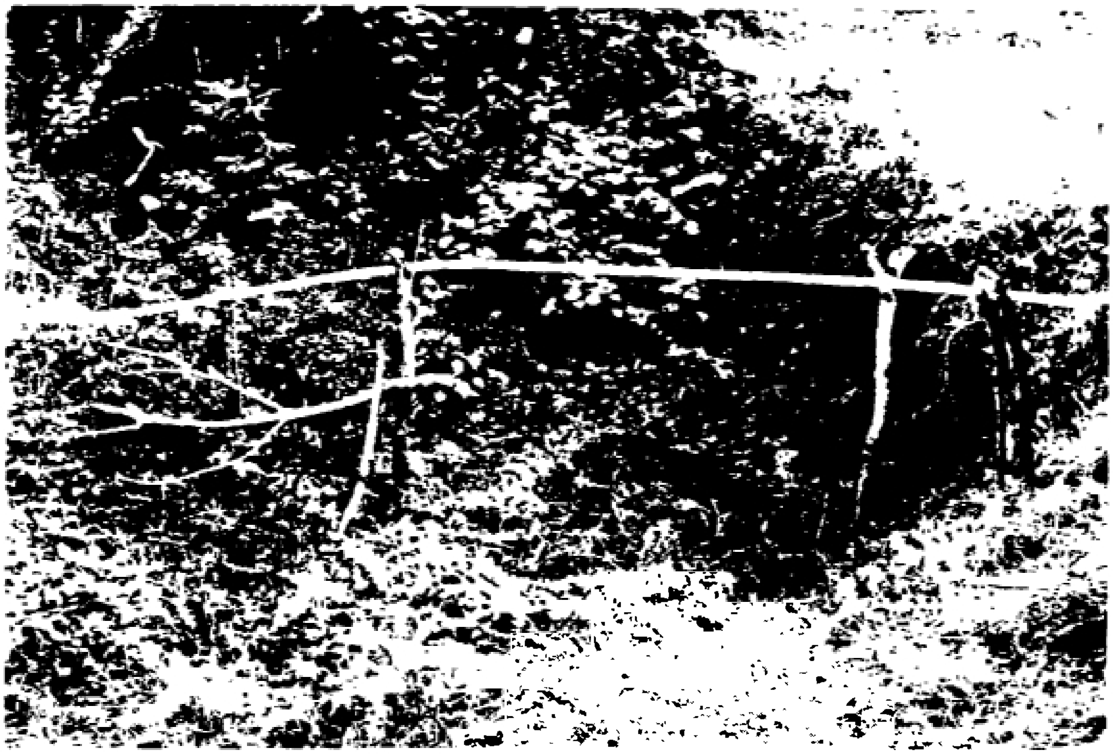

Photo 5. Inadequate creek crossing - Las Jaguas.

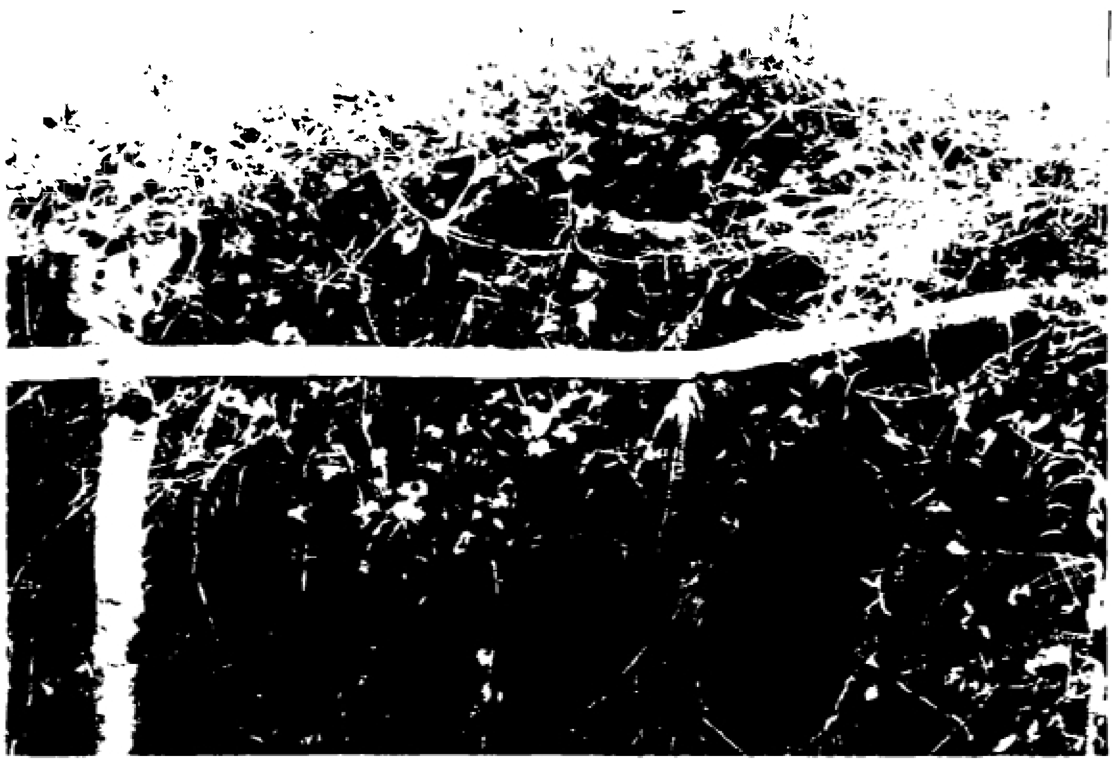

Photo 6. Water leak due to pipe separation - Las Jaguas.

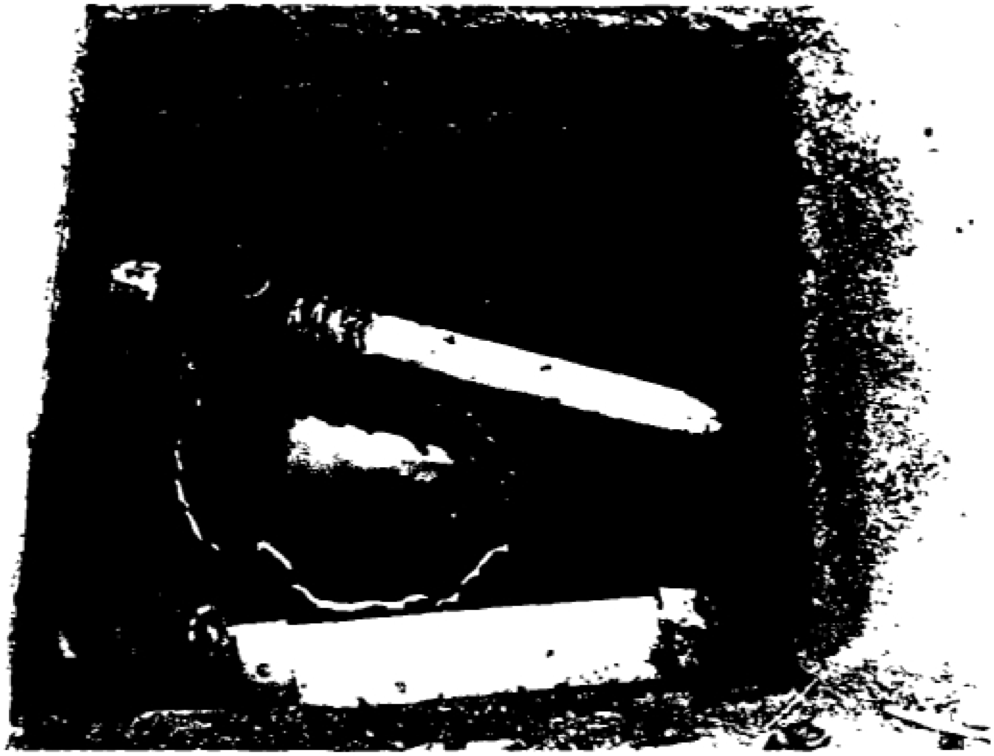

Photo 7. Poor maintenance of valve box, valves already corroded - La Criba.

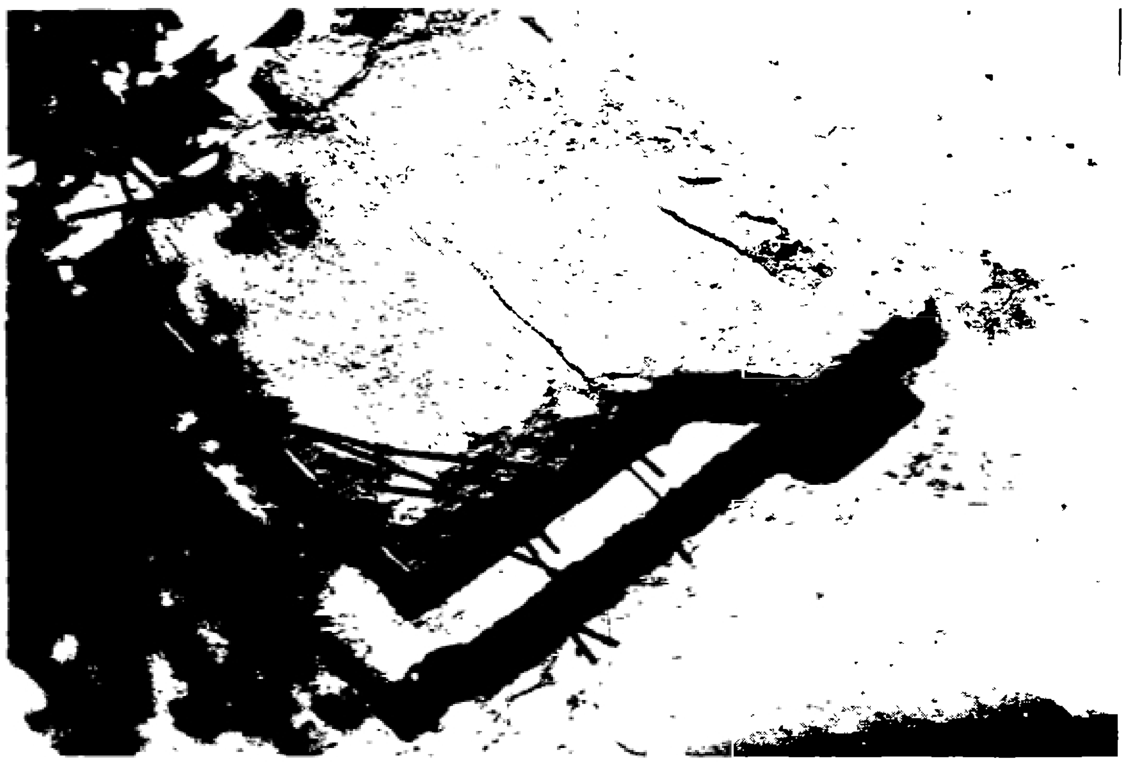

Photo 8. Broken tank cover due to lack of maintenance - La Criba.

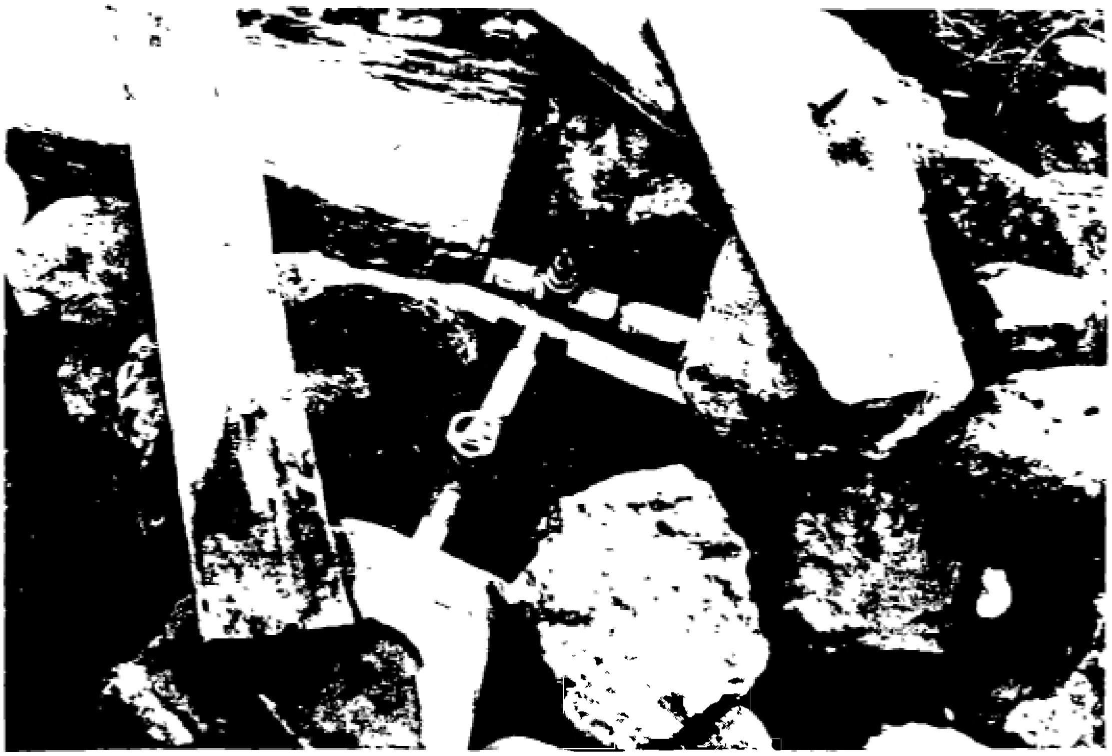

Photo 9. Valves are unprotected with no valve box to cover them. This omission was due to lack of supervision - La Casitas.

Photo 10. Inadequate drainage - San Isidro.

Photo 11. Children benefit from water projects - La Criba.

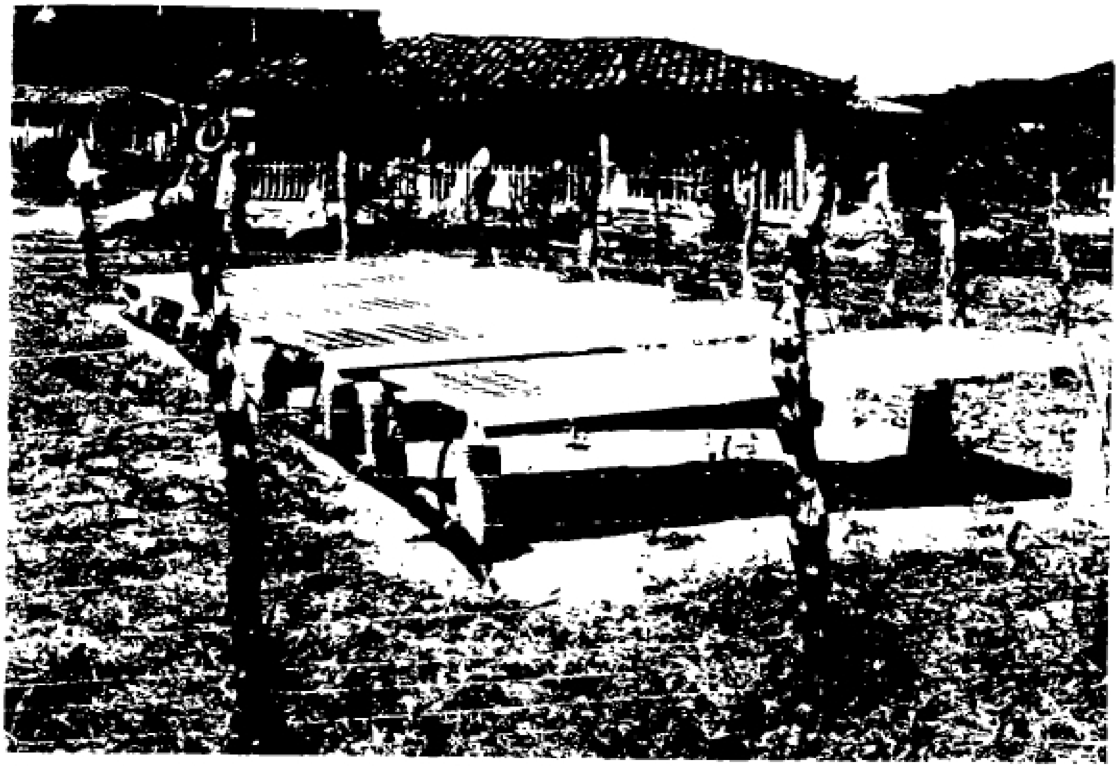

Photo 12. Solar panel for submersible pump - Las Flores.

Photo 13. Water projects bring some other activities. This is a seed farm - Santa Catarina.

ANNEX 3

Key Individuals Contacted

KEY INDIVIDUALS CONTACTED

AID

Betty Facey	Chief, Engineering Office
Edmundo Madrid	Coordinator, Water and Sanitation Project

CRS

Patrick Ahern	CRS Representative, Honduras
Miguel Flores	CRS Engineer
Brad Ack	Agricultural Assistant

EDUCSA

German Licona	Water Program Supervisor
Rene Castillo	Promoter, Choluteca
Jorge David Ventura	Promoter, Camasca Area
Agustín Díaz	Technician, Camasca Area

APPENDIX E

FIELD REPORT ON EVALUATION OF CRS PROJECTS IN THE DOMINICAN REPUBLIC

by

Richard Duncan
and
Homero Silva

APPENDIX E

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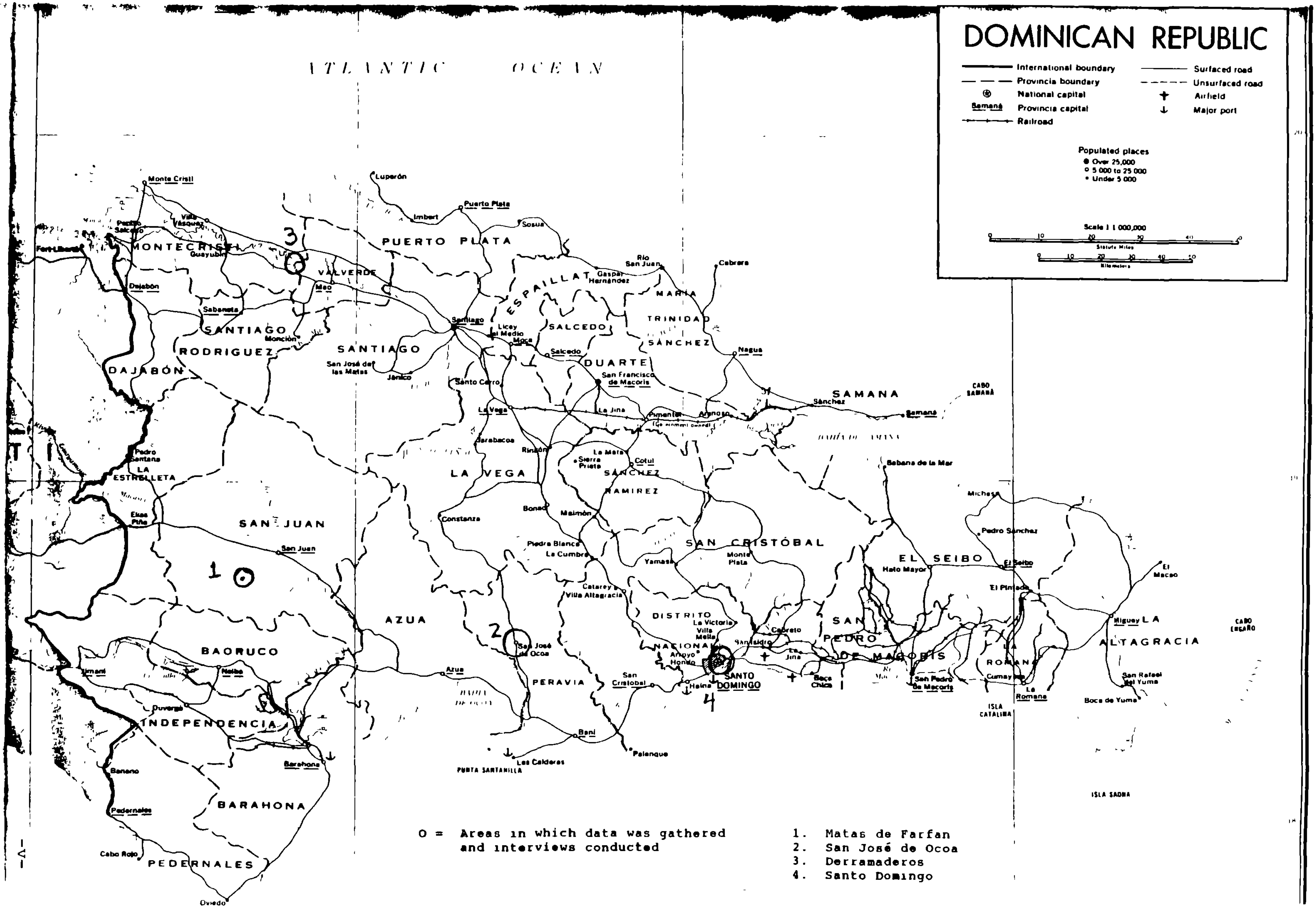

O = Areas in which data was gathered and interviews conducted

1. Matas de Farfan
2. San José de Ocoa
3. Derramaderos
4. Santo Domingo

ACKNOWLEDGMENTS

The Catholic Relief Services (CRS) field office and the project holders, Matas de Farfan Parish (MFP), Consejo Comunitario Derramaderos (CCD), and Associación para el Desarrollo de San José (ADSJO), contributed to the speed and economy with which the field work was carried out.

It was most fortunate that the CRS field office in the Dominican Republic is staffed by professionals familiar with the Agency for International Development, with national agencies, and other private voluntary organizations (PVOs) operating in the country and in a position to lend vital assistance. The field team received invaluable support from the CRS Representative, Mr. Lynn Renner.

Special credit is due to Maria Millian and Monica Maher from CRS. They were instrumental in making preliminary contact with communities visited and were invaluable as active participants in the evaluation themselves. The respect and affection with which they were greeted at one after another of the communities contributed greatly to the good reception enjoyed by the evaluation team.

We would be remiss if we were to overlook the encouragement received from the New York office of CRS. Mr. Ray Victurine made possible the active participation of the CRS personnel.

The USAID Mission provided valuable assistance during the briefing and debriefing meetings. We express our gratitude to Lee Hougen, Chief of Health Programs, and Anne Weeks, Project Assistant.

Many other individuals contributed to this effort. There is not enough space to list them all.

LIST OF ACRONYMS

ADSJO	Associación para el Desarrollo de San José de Ocoa (Development Association of San Jose de Ocoa)
ASTM	American Society of Testing and Materials
CCD	Consejo Comunitario Derramaderos (Community Council of Derramaderos)
CRS	Catholic Relief Services
DSPO	Diocese Social Pastoral Organization
INAPA	Instituto Nacional de Aguas Potables y Alcantarillados (National Institute of Water Supply and Sewage)
LDC	Less Developed Country
lpcd	liters per capita per day
MFP	Matas de Farfan Parish
PVO	Private Voluntary Organization

Chapter 1

INTRODUCTION

The CRS matching grant program in the Dominican Republic has supported three micro regional and two small-scale water projects. This program includes projects which provide hand-dug wells and pumps, gravity flow aqueduct systems, and a latrine component. One project also includes a reforestation element.

The program consists of five project areas: Las Matas de Farfán, San José de Ocoa, Loma de Cabrera, Los Derramaderos, and Bani for a total cost of $248,124.43 of which CRS cost is $156,706.05. CRS is also totally financing a technical feasibility project and a small evaluation project at a cost of $7,000.

The total number of beneficiaries presently planned is 15,105 which will rise to 24,772 at the end of the 20-year design period. The per capita cost of the projects averages $16.89 based on the current number of beneficiaries. Total project-by-project costs are contained in Annex 1.

The purpose of the WASH team visit by Drs. Richard Duncan and Homero Silva was to evaluate and assess the three-year water and sanitation program. They arrived in the Dominican Republic on November 11, 1986, and departed 14 days later. After meetings with CRS-Dominican Republic and USAID and reviewing material on the projects, the evaluation team selected eight villages to visit. Four villages were near Matas de Farfan, three near San José de Ocoa, and one in Derramaderos. The evaluation team's approach to field work included:

- Interviews with intermediary organizations, including church organizations, nutrition program personnel, and Peace Corps Volunteers;
- Interviews with schoolteachers, social promoters and students;
- Interviews with village officials;
- Interviews with a selection of users in their households,
- Interviews with Applied Nutrition Education Program (ANEP) personnel; and
- Observations of water systems (tanks, piping, water intake and taps) and the community.

After the site visits, debriefings were held with CRS and USAID staffs. A draft report, with conclusions and recommendations framed in a provisional context designed for action-oriented decisions and future planning, was left with CRS and USAID.

Chapter 2

PROJECT DEVELOPMENT

2.1 Introduction

In this program CRS-Dominican Republic has supported three micro regional and two small-scale water projects. Because of the diverse water conditions in the country, the program includes projects which provide hand-dug wells and pumps, and gravity flow water systems. All of the projects include a latrine component and one project includes a reforestation element. Projects are designed to support the growth of community organizational capacity, to provide communities with water; and to improve sanitation and health conditions. This is accomplished through a combination of community effort and technical and health training. While the gravity flow programs are similar to those carried out in other countries, the pump program is based on a small, easily maintained, locally-manufactured handpump, which facilitates access to spare parts.

A technical feasibility project provides feasibility studies and assistance in the planning of the projects and a small evaluation project has been used to examine progress toward the multiple objectives of the projects.

The program consists of five projects. In Las Matas de Farfán, 53 wells have been dug and 23 are under construction along with 1,637 latrines installed in Matas de Farfán and San José de Ocoa. In Loma de Cabrera, 22 wells and 536 latrines are under construction, while 154 latrines are planned in Derramaderos.

2.2 Program Approach

The CRS-Dominican Republic program covers a broad spectrum of water-related activities and organizational arrangements. CRS has adapted its program approach to the specific circumstances in each area. It has dealt directly with individual community organizations, worked with a well organized private development association which serves a large area, and with a church-sponsored organization that is engaged in development programs. CRS has even generated a new local community program for in-country transfer of technology. (See Annex 2 for selected community photographs.)

CRS funded the Social Pastoral Organization of Matas de Farfán Parish (MFP) in its community hand dug well program, during experimentation and manufacture of handpumps, as well as by supplying materials and assistance to the on-going development program being carried out.

CRS supports the water project of the Community Council of Derramaderos (CCD) and encouraged Caritas (a local CRS counterpart) to assume the responsibility for the organizational and health education parts of the project. The support for the Development Association of San José de Ocoa (ADSJO) added a specific water and latrine program for 17 small communities to the large program of community roads, agriculture, reforestation, and water systems, already under ADSJO direction.

CRS does not actively participate in the design or organization of the technical or other aspects of the project. However, they review the proposals prior to forwarding them to CRS headquarters in New York and informally consult with and assist the project holders at all stages of project development and implementation.

Once the project is approved, CRS requires semi-annual reports, but the CRS representative, the project officer, and other staff members visit and consult with the project holders and visit communities more frequently. The CRS staff was well informed and up to date on the progress of each of these projects even though this is a small part of their overall program in the Dominican Republic. (See Annex 3 for key individuals contacted.) Even though the water program is only a small part of the total CRS program, there is significant potential from the combination of effort between the water projects and the Nutrition Program which CRS supports.

While the program is only two years old, CRS sponsored a program evaluation in 1986 by a graduate student from the School of Public Health, University of North Carolina. This evaluation was a formative and preliminary evaluation which reviewed all projects, commented on the projects and provided some recommendations. The current evaluation team reviewed the earlier evaluation and took its findings into account in its recommendations.

In one area the earlier evaluation considered--the use of in-country technical transfer--we were unable to directly observe the results, but our interviews supported its potential (see Section 10.8, Project Efforts).

Chapter 3

COMMUNITY SELECTION AND PARTICIPATION

3.1 Criteria for Selection

CRS-Dominican Republic has a well defined set of selection criteria for water and sanitation projects. CRS selection criteria are as follows:

1. The project should respond to the most urgent needs of the community;

2. The project should be a result and expression of broad community participation;

3. The project should be technically and economically feasible and should emphasize the use of local resources and appropriate technology as much as possible;

4. Projects should reinforce community organization and be capable of being replicated;

5. Projects should be sustainable through organization, self-support and self-promotion;

6. The applicant group should have experience in the implementation of projects or have technical and/or administrative assistance.

In general, the community selection criteria are well applied and clearly defined. Most of the communities visited meet the stated selection criteria. CRS does not have a cost limit in its selection criteria. This is a serious shortfall of the program; it is possible that available funds could reach more beneficiaries if a cost effectiveness criteria (i.e., maximum cost per person) had been established at the start of this program.

3.2 Size of Communities Selected

No limit on population size has been established in the matching grant program. Communities chosen are small, poor and underserved. The majority of the projects involve from 10 to 185 families. Larger communities have not been selected as project sites under this program because they have a better opportunity for getting government aid. However, the need for the construction of water supply projects in those communities is also urgent.

An alternative policy would be to invest the money of the matching grant in larger communities, in which a significantly higher number of equally needy people can benefit. The team observed, however, that large communities do indeed have a better chance to receive government aid, so funds available from this grant are being well applied.

3.3 Levels of Service and Community Coverage

3.3.1 Levels of Service

CRS does not have a policy on minimum level of service. Public handpumps and standpipes are the most frequent levels provided to communities in Matas de Farfán and Loma de Cabrera. The community decides on the number of handpumps they need, but project holders approve one at a time. Approval of the next handpump depends on work performed during the past installation. The goal is to have one handpump for 20 families. In San José de Ocoa, the Development Association (ADSJO) provides only patio connection service. ADSJO officials believe that public standpipes are not appropriate for the Dominican Republic because users are careless, usually the children collect water, and fee collection is impossible. (The experience in Los Derramaderos shows the opposite, but it is a well organized community and is able to operate and maintain a standpipe without any problem.) Team members noted that water wastage (faucets continuously running water) is a problem only in communities with poor education on water conservation. The team recommends that CRS provide for standpipes only and let the community pay for the difference in cost, if they desire patio connections.

The main benefit from all the water projects is the reduced distance traveled for water which used to vary from 1 km to 7 km, generally climbing up the mountainside. Wells located by the Social Pastoral Organization of MFP may still be too far away from users. Information gathered indicates that mean user distance is around 500 meters.

ADSJO provides patio connections. Only in a few cases are public standpipes recommended, specifically in those cases where the capacity of the water source is not enough to meet the water demand.

3.3.2 Community Coverage

CRS criteria for community coverage is not clear, CRS only asks that projects be technically and economically feasible. This means that the costs of the CRS project may be smaller than an equivalent government program.

Projects in Matas de Farfán and in Derramaderos, because of their level of service, cover 100 percent of the community. ADSJO requires 75 percent of community coverage as a minimum. Hence, 75 percent of the community must sign an agreement before they are considered for a water and sanitation project.

Water and sanitation projects in those communities visited cover more than 75 percent of the population. In some of the communities visited, people who did not benefit from the water supply expressed dissatisfaction. However, the generally high level of satisfaction may be due to the fact that during the planning process, all of the households have the opportunity to decide whether or not they want to participate in the water and sanitation program. A few exceptions were found where water is not provided because of the water source elevation, as in one house visited at Los Naranjos. Usually if water is not provided to a household of the community it is only because its members did not work in the construction of the project.

Neither information nor time was available for a more detailed analysis of the projects to determine if optimum use of money was made to provide the maximum coverage possible. Service coverage should be selected on the basis of the location of population, density, the cost of developing the source, and the cost of each increment of the distribution system.

3.4 Community Organization and Participation

3.4.1. Organization Factors

In the communities visited there are essentially two organizational factors that should be considered: (a) how communities are organized and what progress they have made; and (b) how they function organizationally within the structure of the project holders' activities.

Derramaderos is well organized and actively seeks assistance in agriculture, health, and education. In spite of skepticism and some technical problems the community formed a water committee. When the design was approved and the material was made available for the construction, the community organized into brigades and each brigade leader was responsible for his team showing up on the proper day.

The community now has a water committee, a school committee, two youth groups (one connected with the school and one with the church), a women's committee, a general development committee, and a special small committee to oversee any problems with the school. The community has finally arranged for the ministry to pay 25 percent of the secondary school budget, but they still finance the remainder. The proliferation of committees has resulted in the creation of a Community Council with the help of Caritas officials. The priest explained that this is an important step, as the different committees need coordination. No collection of funds is taking place for maintenance of the water system as yet, although the system will be inaugurated in the near future.

The MFP community organization is sponsored by the Diocese Social Pastoral Organization. DSPO is the source of funds and the basis for training and education, as well as a forum in which communities can compare approaches, achievements, problems, and obtain assistance.

The structure of the organization includes the general meeting of the Social Pastoral each month to which all communities send delegates for approximately one and one-half days. In addition to this meeting, there are zone coordinators who visit each community in their zone during the month.

One zone coordinator interviewed stated that he dealt with 34 groups in seven small communities each month. Another was familiar in detail with the problems of a particular village and stated that he visited all of his villages each month and that zone coordinators met with the church officials once a month in addition to attendance at the Social Pastoral monthly meetings.

Community observations and interviews indicate that this process reinforces community efforts to organize, to train, to communicate their needs, and mobilize communities for action. Furthermore it is an ongoing activity that does not cease when the water project has been completed in a community. Inserting a water project into this environment ensures the support of an effective community organization over the long term.

Peace Corps Volunteers, dedicated community members, and church officials are all providing support which will result in effective organization in the long term. Nevertheless, the evaluation team found well organized communities still dominated by a few people and those in which factional strife appeared to be prevalent.

One community water committee was headed by a woman who had a secondary school degree and had done some of the digging for the well. The well was about to be inaugurated and the community had invested time and effort in mobilizing its members. The community is reasonably well educated and they have development, youth, and women's committees and even a new children's group formed under the aegis of Save The Children Federation. They had built a school and were now conducting a program of self-help housing with outside assistance. Many government and private organizations have expressed interest in working with this community because it is so well organized.

The organization of another community was still weak but had successfully installed new leadership after its previous leader left the village. In this community the president of the water committee is also the designated repairman for the pump. His wife was training to be a social promoter.

The evaluation team also found communities with differing degrees of factionalism, in one case two parts of one village constructed their own wells. This resulted in what appears to be an organizational split, with each part of the community taking responsibility for its own well. The part of the community visited was dominated by its leader.

In another community a previously installed well was not working and the community had not been able to collect the money for repair. The same community was building another well which was not complete. The factionalism appeared to be the result of different priorities. The men were concerned with the severe drought and lack of assistance in agriculture; the women with the lack of water.

In the ADSJO area, community leaders serve on its executive board. This includes some government officials although they act in their personal capacity. The association controls a large budget, obtains money from many donors, has road-building and other equipment, runs different types of training schools, provide courses, and runs other activities.

The executive director is the local priest whose 17 years in the community make him a key figure. The Association is run like a development agency in which the communities are the shareholders. Meetings are held every month for community leaders from 50 to 65 communities. Discussions are held on community needs and availability of assistance and funds. As a result of this mix of donor funds and community needs, programs are developed. At this time, the area requires a reforestation program if the land is to be saved so this is a priority activity. However, the Association conducts agriculture, road, education, and health programs depending on what funds it is able to obtain for selected purposes -- from a wide variety of donors.

The broadly trained project director for the CRS water projects assists in the community organization and provides lectures and information on technical, organizational and health aspects of the project. He also arranges for engineering support and supervises community workers.

Organizational capacity among the villages visited included one in which the water project appeared to have consolidated the organizational structure with significant future potential; one in which a small part of the community had undertaken the project and appeared well organized but had left the rest of the community untouched; and one with apparently serious organizational problems. In the last case, the development committee which handled water affairs was also conducting a strong reforestation program with the assistance of the Association.

It appears that organizations which have not yet developed effective self-sufficiency function reasonably well as long as they have support and assistance. Discussions with the priest indicate that, in general, communities are progressing toward self-sufficiency. Constructive criticism of the Association programs is welcomed as an indicator of community organizational strength.

Table E-1 was devised to assess the level of organization, health education, and participation. The elements are rated on a scale of 0 to 3. The ratings were based on a few verifiable facts, observations, conversations, and experienced but subjective judgments. The confirmation of some elements and information from previous studies, as well as the obvious intuitive relationships, provided a substantial base for judgments about organizational development.

In examining Table E-1 in which organization development was classified from 0 to 3, there was relatively small gain in organizational capacity. One community with limited capacity improved, one with moderate capacity matured into a strong organization, and others on the low and high end did not change significantly.

There is an important cultural factor here. The tradition of independent organization and action is very weak. There is an established pattern of dependence on outside authority and assistance. It is particularly difficult to deal with because of the pattern of rationalization that exists. Poor communities have a particularly strong sense of dependency -- which creates unrealistic expectations.

Therefore, the existence of organizations that can function to create a water program without having reached their potential for organizational growth may be a major accomplishment. The same measure of organization in the Dominican Republic cannot be used as with the other two countries visited by the evaluation team because Guatemala and Honduras have a strong Indian tradition of responsibility and organizational capacity.

Table E-1

APPROXIMATE CLASSIFICATION OF KEY VARIABLES RELATED TO THE CRS WATER PROJECTS IN DIFFERENT VILLAGES

DOMINICAN REPUBLIC

	BEFORE			INTERVENTION			AFTER					
	Prev. Org.	Awar. &Educ.	Part.	Trg.	Effrt.	Supp.	Org.	Chge.	Awar. &Educ.	Chge.	Part.	Chge.
Los Jovillos	1	0	1	1	1	2	2	+1	1	+1	1	0
Ranchito	1	0	1	1	2	1	1	0	1	0	1	0
Moranta	3	2	2	2	3	2	3	0	3	+1	3	+1
Guayucan	1	1	2	1	2	2	1	0	1	0	2	0
Derram-aderos	2	1	2	2	3	2	3	+1	2	+1	3	+1
Mongote Naranjo	1	0	0	1	2	2	1	0	1	+1	1	+1
Hierba Buena	2	1	2	1	2	2	2	0	2	+1	2	0
Palos Grandes	1	1	1	1	2	2	1	0	2	+1	1	0

NOTES:

"BEFORE Variables" are estimates obtained from interviews and other sources on the level of organizational capacity, the degree of previous awareness of sanitation needs and level of health education and the degree of community participation which existed prior to the initiation of the project.

"INTERVENTION Variables" are estimates obtained from reports and interviews on the amount of training provided, the level of effort in the community and the support from all outside agencies during execution of the project.

"AFTER Variables" are estimates based on observations and interviews on the present state of organizational capacity, awareness of sanitation needs, level of health education, and the degree of community participation which now exists in the community. A separate column records the change in each factor for each community. See methodological notes for the individual indicators used for each variable.

METHODOLOGICAL NOTES FOR TABLE E-1

The general guidance in classifying the reports, interviews, and observations on each village visited is as follows:

COMMUNITY VARIABLES

Organization

0 = community organization exists in name only
1 = organization accepted by the community with few or no accomplishments
2 = functioning organization with some accomplishments (schools built, etc.)
3 = multiple organizations or very active organization dealing with diverse community problems.

Awareness and Education

0 = extremely limited awareness of health and sanitation practices
1 = awareness of sanitation needs, little knowledge of health - no observed practices
2 = high awareness, considerable health knowledge - little evidence of practices
3 = both extensive health knowledge and evidence of regular application to community conditions.

Participation

0 = community dominated by one person or group, factionalism or general lack of interest by community
1 = strong leadership and passive participation by community
2 = strong or diffuse leadership with some active participation by significant portion of community
3 = diverse groups and leadership in multiple channels and high level of active participation.

INTERVENTION VARIABLES

Training

0 = no training was accomplished during the project
1 - limited training (e.g., only in construction)
2 = community training on different aspects of the project (e.g., organization and health)
3 = comprehensive training in health organization and construction including course away from the village for certain members.

Effort

0 = community made little or no effort to support the project
1 = community assisted in construction and little else
2 = community made significant effort to support the project
3 = community took independent initiative to support project and made special effort toward project accomplishment (incorporated school, other community facilities, etc.).

Support

0 = neither project holder, community leadership, nor other participants gave significant support to the project
1 = limited efforts were made by project holder and other (to provide minimum support or deal with community problems)
2 = adequate support was provided in most aspects of the project
3 = consistent efforts were made to support community actions and attend to any project problems which arose.

3.4.2 Participation Factors

As in other countries, participation was evaluated in terms of roles in planning, in implementation and in sharing of the benefits and costs.

Participation in Planning

In the Dominican Republic the CRS program includes participation in project holder activities and in community activities.

Participation is encouraged in the planned monthly meetings held by MFP, ADSJO and Caritas with CCD. Continuing participation in these activities represents the spiritual and emotional elements that are important to peoples' lives and focus on matters which community members consider of consequence. Church officials in each of the areas visited are extremely dedicated, which had a marked effect on the participation process.

Aside from the decision to organize or modify organizational structure to obtain support for their project, the communities had very limited participation in the technical planning and design of the projects. In one case, a community did participate in the design of a water system, but it had to be redone by a professional engineer. At the same time, the participation in monthly meetings held by project holders and community representatives allowed an opportunity to fully understand what kind of participation was expected of them and to take decisions to their communities for discussion.

Participation in Implementation

Once people were convinced that a water system was to be installed, they were willing to participate in the activities on construction and installation. What is also remarkable is that many of the well digging operations in the Dominican Republic took as long as a year to complete; for poor communities in general, this is a long time to sustain concentrated community action.

In regard to participation in repair and maintenance, some communities assumed that the problems would be taken care of by others. It was found that the designated repairman was usually both competent and willing to invest his own time in the project. In one case, he was willing to finance the parts when the community was indecisive.

Participation in the costs of a project was universally accepted although, whenever possible, an effort was made to convince donors to assist.

In the MFP area, the Peace Corps Volunteer, working closely with the communities, recommended that funds for the installation of the handpump and the tools which are provided for repair be collected in advance, so that the community would consider the pump its own. In only one community visited was money being collected for maintenance and repair. In others, the system was too new to reasonably expect that the monthly fee would be collected. Tradition requires that when there is a problem in the community, people contribute to a fund to resolve it. However, in one community, the women's committee had made efforts for several weeks to collect the cost to repair a pump and had not gathered enough money to buy the parts even though the repairman was willing to contribute his own time.

Participation in Benefits

In most communities there was equal sharing in the benefits. When standpipes were installed they were spaced so that different parts of the community would be served. The pumps were 500 meters from users on the average. There appeared to be community sharing even when there was a water shortage. In two communities in the ADSJO area, however, only a part of the community had organized to participate in the water project. Therefore, only those who participated actively in the construction and installation of the system were receiving the benefits.

Changes in Participation

Using Table E-1 to classify the level of participation, it was found that there had been a limited increase in participation in most communities. One community which had very little participation before the project made important progress. Two communities which had significant participation prior to the project had consolidated and increased participation.

In those communities where progress had been made, women's participation in particular had increased and their roles had become more active. Even in one community which had made no progress in participation, the women's organization was one of the major factors which was pressing the community toward more organization and greater participation.

Chapter 4

SYSTEM DESIGN AND CONSTRUCTION

4.1 Criteria for Water and Sanitation Systems

Water and sanitation projects were evaluated by reviewing some major areas in the eight communities visited. The major areas reviewed were as follows:

- source selection and measurement,
- source protection,
- design criteria, chlorination, breaktanks.

4.1.1 Source Selection and Measurement

Type of Source All of the communities visited were using groundwater from springs or from dug wells as their source of drinking water. Handpumps and gravity systems are the main tools used to supply this water. ADSJO, MFP and CCD prefer to use groundwater and either gravity-supply systems or handpumps because they believe that a water project will be successful only if the community is able to maintain and operate it.

Water Quality In general, water supply sources of the projects visited are of better quality than the original sources. This was also the general belief of the inhabitants of those communities, and the members of the evaluation team. This conclusion is based on conditions present during the field visit and information gathered by the evaluation team.

One exception, however, is Los Limones, a project that is presently in the design stage and is an example of existing, poor environmental conditions (pre-project). This community is actually using both an irrigation channel and roof catchment system as its sources of water. The irrigation channel collects return water from rice fields and runoff from other communities. This channel also serves as a garbage deposit for all the solid waste generated in those communities. Dead dogs, chickens and cats, feces, etc., end up in this channel. Water quality is marginal, not much better than sewage. During the evaluation, water was either observed or reported with soil, debris, floating matter, frogs, earthworms, etc. This condition is not a result of poor quality of the water source, but a result of inadequate operation and maintenance of the water system.

No information on physico-chemical and bacteriological tests is available for any of the water supply projects, because sampling and analysis of water is not conducted in any project. This is contrary to INAPA recommendations for water sampling and analysis of water sources during the feasibility study. CRS officials are reluctant to conduct sampling and testing of water sources because of the high cost and logistics involved. In the past, a program to collect and field analyze water samples was unsuccessful.

The evaluation team recommends a more frequent sampling, not only during the design phase, but also during operation of the system. Simple techniques and enough field equipment are available to conduct most of the analyses required. Field equipment is available on the market to measure pH, temperature, conductivity, and turbidity. Test strips are available for semi-quantitative determinations. The test is performed by dipping the test zone of a strip in the water sample and comparing the results with a color scale. The strips are particularly useful for testing for nitrates, nitrites, sulfates, iron, ammonia, copper, and hydrogen. Also available are color disc test kits for testing of chlorine, nitrate, ammonia, pH, iron, chromium, cyanide and phosphate. The color disc test kits can be used easily in the field and will give more accurate results than test strips, but are more expensive to buy and operate.

Simple water analysis kits should be acquired and made available to the project holders. This cost should be considered during budget preparation. Also considered should be the cost of collection and analysis of samples during the design and operation of the system. Slow filtration is recommended where bacteriological quality does not meet the recommended limits (10 coliform/100ml).

Water Quantity One of the major benefits of these water supply projects is that the distance (hence, the time) between the community and the water tap has been tremendously reduced. Still, in some projects the distance needs to be further reduced. Table E-2 presents the amount of time people spent for water collection, for a single trip to the water source. The average time is now 20 minutes for Matas de Farfán, 10 minutes in Derramaderos and less than one minute in San José de Ocoa.

Table E-2

Original Time Spent on Water Collection in a Single Trip

Community	Time Spent (Hours)
Jovillos	1
Carrera Bonita	2
Mesetas	1
Derramaderos	2
Naranjos	1
Palo Grande	1.5

Improvement in water availability is another important achievement of the CRS water projects.

From the eight communities visited, three do not have adequate amounts of water. In two of them, this only occurs during the dry season from April through June. During this period, water from the project is used only for drinking purposes, and additional water needs are satisfied from the old water sources. In the third community, Derramaderos, the capacity of the source is limited all year round.

Water flow measurement practices vary according to the source of water. In springs, water flow measurement is conducted at different times during the dry season. The time volume method is generally used. In dug wells, well pumping capacity is usually estimated by the bucket-rope method, but in Los Limones, a handpump test was conducted to estimate well capacity.

4.1.2 Source Protection

Three of the communities visited, Derramaderos and two communities in San José de Ocoa, have the water supply source above and distant from the community. In one community, Naranjitos, the water supply source is close to the community making it more subject to contamination. For the protection of watersheds, ADSJO is conducting an aggressive forestation program -- about a half million trees have been planted. Protection of watersheds increases the hydraulic holding capacity of soils, consequently, water availability is extended into the dry period. Most important, water quality is also improved. MFP and CCD do not conduct this type of program.

Water intakes in those communities with gravity systems need to be improved. Springs are allowed to surface before being tapped. In order to achieve good sanitary protection and maximize the amount of water capped, the spring should be tapped before it comes out to ground surface. This is done by digging into the hillside so that a sufficient depth of the aquifer is tapped. The water intake should be covered to prevent runoff water entering the intake and mixing with spring water.

In MFP projects, none of the communities is served by springs, rather, construction of dug wells is the customary practice. Dug wells are covered with a concrete slab designed to carry away water spills. Diversion channels are constructed to prevent entrance of rainfall runoff into the well. Early designs did not have these features.

In summary, intake structure location is generally inadequate. Potential for seasonal flooding and contamination of the intakes exists. Those communities with a flooding potential of their water intake are Naranjos, Yerbabuena, Palo Alto and Derramaderos. Dug wells of later design, however, are excellent.

4.1.3 Design Criteria

CRS does not get involved in the design, construction, or operation of the projects. Project holders carry out these activities. MFP has its own set of design criteria which evolved from the experience gained from working with communities and adapted to reflect the economic constraints they work with.

MFP provides one well for 20 families (approximately 140 persons), which is adequate. The World Health Organization recommends no more than 200 persons per well. In only one case (Los Ranchitos) a well was serving 53 families (approximately 370 persons). The average distance between the household and the well is also an important factor and should be improved; it has been reported that the average distance is approximately 500 meters. Recommended maximum distance is less than 150 meters, although longer distances do not seem to have a significant impact on people's health.

CCD and ADSJO water projects are designed by engineers from INAPA who use INAPA design standards. Discussion of some of the design parameters follows:

- <u>Source Requirement</u> INAPA recommends that the water supply source have a minimum capacity equal to or greater than the design maximum day demand. As mentioned before, some of the water projects have used water sources with a capacity smaller than the maximum day demand.

- <u>Per Capita Consumption</u> The INAPA's recommended per capita consumption is:

	Range lcd	Average lcd
Public Standpipes	24 - 48	36
Patio Connections	72 - 120	96

Interviews with INAPA engineers were held to discuss the adequacy of standards to reflect CRS's funding approach. It was agreed that some modifications may be needed on the water consumption factor. Experience gained during the operation of the CRS water supply projects will help to check and, as needed, modify the actual water demand factor.

- <u>Population Projections</u> Water systems are designed for a future population. A population census is conducted during the initial visit to the community. This information in conjunction with the growth rate is used to estimate the design population. Growth rate factors vary from 1.02 to 1.03. The linear method is used for population projection.

- <u>Design Period</u> The design period recommended is 20 years. The design period may be excessive. By using a 20 year design period, the system is being designed to supply water to a non-existent population. This increases the cost of a project and may prevent other communities from obtaining an improved water supply system.

- <u>Average Day Water Demand</u> This is estimated by multiplying the per capita consumption by the design population.

- <u>Maximum Day Water Demand</u> INAPA recommends a peak day water factor of 1.20, which is a factor used for the design of CRS projects. This maximum day water demand is estimated by multiplying the average demand times the peak factor. This demand is used to determine the adequacy of the water source. This is also used to size the transmission line.

- <u>Peak Hour Water Demand</u> INAPA recommends a peak hour factor of 2.0. This factor is used to size the distribution system. The distribution systems used are the branch type; no looped systems were reported in any of the communities.

- <u>Storage Requirements</u> INAPA calls for a storage capacity of 25 percent of the average daily use. The team did not review information on the capacity of tanks, as the tank capacities seemed adequate. No water shortage due to this condition was reported.

- <u>Hydraulic Design</u> Darcy-Weisbach and Hazen-Williams equations are used for the design of the transmission line and the distribution system. Pressure breaker chambers are used when needed.

- System Design All of the gravity flow systems constructed with matching grant funds are of a very simple design and work by themselves without the need for an operator. Gate valves are the only control those systems have.

- Minimum Pressure Minimum recommended pressure is 10 meters. In general, this pressure is met. There was an instance where a house was found located above the hydraulic piezometric gradient, which precluded the household from receiving patio connection service.

- Appurtenances Air relief valves at high points and drain valves at low points should be installed in the transmission line. Location of air relief valves and drain valves on those projects visited follow design criteria and seem to operate well. No complaints were reported of air accumulation in pipelines plugging of those lines.

- Sanitation Systems No information was obtained from INAPA in regard to the design and construction of latrines. However, field observations indicate that latrines seem to be well designed. Depth, capacity, location and groundwater pollution prevention are adequate.

  The sanitation component in this program is undertaken after the water system is installed. The sanitation component includes efforts to build awareness and understanding and to encourage communities to request, install and use latrines. Some communities had a few latrines, supplied by the Ministry of Health, but for the most part they relied on open field defecation. Latrines found were the conventional ones. They often had problems with odor and flies. Odor is offensive, especially in the older ones, which may prevent their use.

4.2 Materials and Methods of Construction

Most of the materials used in the construction of water projects are bought in Santo Domingo or other large cities. PVC pipe, fittings, glue and cement are manufactured there. Sand, stone and wood are provided by the community and are locally available. Bronze faucets and gate valves are imported. Slip-joint PVC pipe is used for large diameters and solvent welded PVC pipe is used for small sizes. MFP and ADSJO buy large amounts of materials to get wholesale prices and have well-organized storage sheds.

Materials used in the construction of latrines vary among project holders. Construction costs of latrines in San José de Ocoa are high, RD 133.00 (US $42.90), compared with RD 35.70 (US $11.51) at Las Matas de Farfan. The use of zinc material, which costs RD 103.60 (US $33.60), for walls and roofs is the main reason for this tremendous difference in cost, an example of over-design. Appropriate regional materials could be used without hampering the functioning of latrines.

Methods of construction are adequate. Picks, shovels, and a few tools such as pipe cutters and pipe wrenches are used rather than construction equipment. In the case of MFP projects, the dug wells are dug by hand, and the casing and concrete slab are constructed on site. The handpump parts are brought by the project supervisor and assembled on site. This serves as training for the pump operators.

In the case of gravity flow projects, a project supervisor manages the project and a mason helps the community to construct the intake structure and the storage tank. A person is selected, among the members of the community, to be in charge of the project. The community digs the trench and installs the pipeline. The supervisor trains them in the installation of gate valves and faucets.

Latrines are dug with picks and shovels; the concrete slab and the toilet are constructed on site. A mason instructs some of the members of the community on forms preparation and on construction of slabs and toilets.

4.3 Management

CRS requires semi-annual reports from the project holders, but CRS representatives and project officers and other staff members also visit and consult with the project holders in addition to visiting the communities. The CRS staff was well informed and up-to-date on the progress of each of the projects.

CRS leaves the management of projects to the project holders. Once a project is approved, money is deposited into a bank account to be withdrawn by the project holder.

Materials are acquired by project holders at wholesale prices and stored in their warehouses. There is a good coordination on the delivery of materials. Materials are shipped to the project site in a period of one to two weeks. Between the time that materials are ordered and delivered, the water committee prepares the storage shed.

It is concluded that, in general, CRS has an effective management plan for the implementation of the water supply projects.

4.4 Financing and Economic Aspects

CRS requires a community to pay for part of the project. The community provides labor, local materials and funds. During the feasibility study, the community pays for lodging and CRS pays for meals and transportation of the survey crew and engineers. In addition, on projects with high costs, ADSJO requires the community to pay for cement and for the transport of materials.

An effective use of the financial resources available has been made. CRS average per capita total cost for the water systems is $20.33. Some communities visited pay for the O&M. Other communities are in the process of setting their water rates with the aid of either CRS or project holders. Table E-3 shows the rates paid in the communities visited:

Table E-3

COMMUNITY WATER RATES

Community Name	**Cost (RD/month)* per family**
Jovillos	1.00
Ranchitos	0.45
Pomoroso	0.25
Derramaderos	1.00
Hierbabuena	1.00

* U.S. $1 = approximately 3.1 RD

The O&M costs may have been set without any knowledge of the expenditures involved in the O&M of a water system. In at least two communities, Ranchitos and Pomoroso, financial problems were reported to the evaluation team: lack of funds has prevented the handpump repair in Ranchitos.

Chapter 5

SYSTEM OPERATIONS AND MAINTENANCE

5.1 Introduction

The weakest part of any rural water supply program is the O&M phase, for a number of reasons. First, an insufficient number of trained personnel exists, causing water system equipment to lie in disrepair soon after construction. More skilled and semi-skilled technicians who can carry out simple repair and maintenance work are required. Second, little is done to train water utility personnel responsible for technological detail in project design, construction and operations. Training should start during the construction period, so that water operators can see the water system being built and be ready to operate it when construction is completed. In some cases, at least one person must be retained on the job during the first year of operation to continue the training and to supervise operation of the water systems.

5.2 Organizational Aspects

The first requirement, before a community is selected for a water project, is that a water committee be elected to be in charge of the construction and, later, of the operations and maintenance of the system. This committee will also collect fees and schedule community members for the operations and maintenance of the facilities.

Community meetings are regularly held, first during planning, later during construction and much later during the operation of the projects. During the last phase, monthly meetings are held and community members are obligated to attend. In case of absence, one must present in writing the reasons for not attending the meeting.

Each project holder has developed its own set of regulations for the management, operation and maintenance of the water project, which each member of the community is obligated to meet.

The maintenance of the system is carried out by all the members of the community, sometimes with the help of the water operators. The operations and repairs are conducted by the operators with the aid of the community. Two to four operators are selected among the members of the community at the start of the project and trained during the construction.

MFP has organized the O&M of the handpumps by dividing the project areas into 11 sub-areas. Each sub-area has a pump operator who is in charge of several communities. In case of problems, the community goes to the pump operator who attempts a repair. If he is unable to repair it, he goes to the MFP technician. If the technician determines that the pump operator cannot solve the problem, he visits the village and repairs the pump.

5.3 Operational Status

Limited O&M information is available from a community whose water system has been in operation for a short period of time. During this period, especially in rural communities, the system is in the "tuning up" phase, which is the phase when many problems appear, because of the low-quality construction. This period alone cannot be used to evaluate the water supply project.

Communities visited had been operating at the most for two years. Moreover, there were several only recently completed. Still, the team learned some of the operational problems, especially those related to water quantity, water quality, system reliability and system logistics.

Table E-4 presents the operational status of the systems visited, in regard to water quality and quantity.

Table E-4

OPERATIONAL STATUS OF SYSTEMS VISITED

Name of Community	Water Quality	Water Quantity
Sabana Tuna	tu, ST	unknown
Jovillos	tu, ST, fr	inadequate, DS
Carrera Bonita	pd, fr	inadequate, DS
Ranchitos	unknown	adequate
Vallecitos	good	adequate
Charco	tu in RP	adequate
Pomoroso	ew, cl	unknown
Moronta	pd	adequate
Derramaderos	cl	inadequate
Naranjos	tu in RP	adequate
Yerbabuena	tu in RP	adequate
Palo Grande	tu in RP	adequate

cl = clear	b = floating debris	s = sediment
tu = turbid	cr = cricket	fr = frog and frog larvae
ew = earthworm	pd = plastic dust	ST = sometimes
RP = rainy periods	DS = dry season	

Only one handpump visited in Matas de Farfan was out of operation (Ranchitos). However, there were reports that two more were also in the same condition (Vallecitos and Charco). In Ranchitos, the pump operator reported the check valve broken. He has not been able to collect enough money to repair it. The community went back to the old water source, a spring, which is being planned for use as an additional water source.

From Table E-4, it can be observed that water quality delivered by these systems varies from adequate to marginal. In all of the dug wells, water was observed to be clear. In two wells, PVC dust resulting from abrasion was observed. In two others, frogs were reported to be found in the water. In one, earthworms were found.

Water systems are generally supplying adequate amounts of water. Eight communities (Sabana Tuna, Ranchitos, Vallecitos, Charco, Moronta, Naranjos, Yerbabuena, Palo Grande) reported no water shortages, but two do have a shortage during the dry season and one, Derramaderos, has it all year round. However, this is not an operational problem; the community knew about this shortage problem during the design phase.

5.4 Constraints

Locations of most of the water intakes are too far away from communities and up in the mountains. Given the situation, maintenance may be impeded. However, all of the communities visited seem to have taken good care of the water intakes. The condition of access roads during the rainy season and the location of water projects have reportedly prevented the implementation of water sampling programs. Economic constraints may also be confronted by project holders, especially if CRS decides not to look for additional funds for water supply projects.

Chapter 6

HUMAN RESOURCES DEVELOPMENT

6.1 Personnel Selection

CRS did not participate in personnel selection of project holders or communities. However, they do informally discuss project holder staff needs and problems with key project personnel at different times during the project.

6.2 Training

Technical training is mostly conducted on-the-job by project holders. In the cases of MFP and ADSJO, the monthly meetings provide an opportunity for needs assessment and problem discussion. Occasionally special courses are sponsored by the organization for required community skills, including such things as water system maintenance and pump repair.

In the case of MFP, a special course was also given for persons from Loma de Cabrera to provide them with the skills to initiate a well digging program in that area. This is the only example the evaluation team found of in-country transfer of technical skills, and the reports on the program indicate that it is making significant progress.

In Derramaderos, the church-sponsored program provides continuing courses in technical, organizational, and other matters. Members of the communities have attended many of the courses. Church organizations follow up training with support to organizations. Community leadership opportunities are encouraged for learning new skills and applying them or passing them on to other community members.

ADSJO provides training in the field during the installation of the water system and periodically on organization and health education. The Association maintains training schools in San José de Ocoa which villagers can attend. All of the field courses are given by the project manager who has had training in a variety of organizational and health skills as well as in the installation of water systems.

In all of the villages visited, the training opportunities both precede and continue after the installation of the system. Also through the church organizations, there is access to the technical skills of the project holder whenever problems arise that cannot be handled by the community. This is particularly useful in the MFP case when the digging of wells and the installation and repair of pumps may raise important problems beyond the capacity of the community (e.g., caving in, serious pump defects, etc.).

Another useful factor in the MFP program is that the pumps are manufactured in the community, and therefore training can be done locally and parts and repair advice is available.

Training in health education appears weak in most projects. Communities rely on clinics for health care even when they are quite distant. They see no need to have local people as health promoters. Most prenatal care and delivery are done in the larger communities with the mother leaving the village before the expected delivery date and remaining away until after the baby is born.

Overall information indicates that when promoters from the Ministry of Health reside in an area they do not do any training. A few of the communities visited by the evaluation team had health promoters, but there was little evidence that they provided much training.

A national nutrition program, which is supported by CRS, has training programs in regional centers which overlap with some of the water projects and therefore provide training for community health promoters. CRS is planning more coordination between the nutrition and water project activities.

Chapter 7

HEALTH, SANITATION, AND WATER USE EDUCATION

7.1 Community Health Education Approach

CRS has no direct approach to health education except through its support to the nutrition program. It does support a latrine program in most projects, and includes a requirement for health education training in its agreement with project holders.

In its informal relationships, CRS encourages health education training. Project holders include lectures to communities and informal support of community-wide latrinization. Monthly meetings are said to include materials that promote health education and improved sanitation (films and audiovisual materials); however, the evaluation team did not see any materials in schools or in any of the villages visited.

The nutrition program mentioned above is one resource which is beginning to be used. Discussions with the nutrition project coordinator in the MFP area indicated that she is aware of the water project and attempts to include water project communities in the program when they meet the criteria required by the project.

7.2 Criteria Established

CRS does not directly establish health education criteria; projects follow local health agencies' guidance.

7.3 Coordination with Construction and Maintenance

The project provides the requirement and the opportunity for initiating or reinforcing health and sanitation education. In many instances there are ongoing health education activities from other sources--the nearest urban health clinic, the nutrition program, or village Ministry of Health promoter. Lectures were given during the course of construction in San José de Ocoa and Derramaderos and the monthly meetings of the Social Pastoral Group in Matas de Farfán often emphasize health practices. Effective coordination requires that the project holders assess the existing long-term health education programs available and incorporate these efforts in the project or develop alternative activities where such resources are not available. There is a long history of health education efforts (clinics, public information, and radio).

7.4 Materials and Methods Used

The evaluation team found very few materials being used for health education. In most cases lectures in communities were the only source of information. Monthly meetings by project holders were said to use audiovisual materials, including films, videotapes, slides, and other supporting materials. Posters, stickers, or other informal educational displays were not evident.

The methods used by project holders vary, but all include some lectures in the communities, some courses for designated community workers, and some courses available at either monthly meetings or public health clinics.

Some awareness building and health education training is included in all latrine programs. In the Derramaderos latrinization project which has just been approved, the community has taken its own survey of the sanitary conditions prior to approval of the project.

The significant level of health knowledge observed among beneficiaries appears to derive from the reliance of women on nearby urban clinics, the health oriented church activities, and other projects such as the nutrition program. These are the major methods by which health education has and will continue to be delivered. In all cases there is an awareness by project staff of these resources but they are not always consciously incorporated into the project activities.

7.5 Funding Allocation

It was not possible to separate out the funding for health education in the project budgets since all project holders included health education as a part of many other activities. The question is not how much is allocated, but how the potential benefits of health education activities can be incorporated into the projects.

7.6 Constraints

Aside from the constraints caused by remoteness, level of education, focus on convenience, and the difficulty in adapting supporting materials, several key constraints have been referred to above. These include dependence on the distant clinics and difficulties in coordinating the diverse sources of health education training and exposure.

Among the cultural patterns which inhibit the implementation of the project are the vocal tradition and the lack of sustained effort which is in marked contrast from the Indian cultures in the other countries of the program. In general, Dominican villagers enjoy talking, speculating, and arguing about activities. They are interested in how they and their village appear and impress outsiders even though they may not always reflect reality. Similarly they can be mobilized to great accomplishments in emotionally generated short-term activities but may not follow through on the daily requirements. While not universally true for all people and communities, these tendencies must be seriously taken into account in the implementation of Dominican projects.

Chapter 8

ADMINISTRATION AND MANAGEMENT

8.1 Institutional Arrangements

CRS-Dominican Republic has developed effective cooperation with CRS-NY, with the USAID Mission and with the project holders that make it an effective intermediary and promoter of its program. It has promoted Caritas participation in Derramaderos, fitted its program within the much larger activities of San José de Ocoa and provided critical support to the church-sponsored Social Pastoral organization in Matas de Farfán in both the development of the pumps and the water program. In addition, it has supported the in-country technical transfer that appears to be working well. It is now discussing with AID and other donors the possibilities of continuing the program with additional funds.

8.2 Coordination

CRS maintains an information coordinating posture which is reasonably effective. For example, work is now being done on the incorporation of the nutrition project into water project communities.

The development of an in-country transfer of capacities through the training course given at Matas de Farfán for personnel of Loma de Cabrera is another example of positive coordination resulting in a new well digging project.

Project holders in general have disverse programs within which the water project is only one element. Interviews and observations indicate that the water projects are not only coordinated, but integrated with those programs.

The use of zone coordinators in MFP projects and the technique of monthly meetings provide a sound basis for continuing exchange of information and effective coordination, although some improvement in coordination among projects might be accomplished.

8.3 Current Funding Status

CRS-Dominican Republic reports no difficulty in obtaining funds for projects, and the project holders do not report difficulties or delays except in one case (Derramaderos) which appears to be the result of technical questions rather than allocation problems. Annex 1 provides the most recent information on funding, costs, and beneficiaries.

8.4 Information Systems

CRS requires reports from project holders at regular intervals, but information contact is frequent and apparently effective. With the small staff of CRS-Dominican Republic and the project holders, a minimum of written reports appears to be satisfactory. The financial reports examined were adequate. The evaluation team found that up-to-date information was available and no problems with communication between project holders and CRS were observed.

Project holders appear to have good information systems. The zone coordinators of the MFP, in addition to monthly meetings, provided continuing information on progress. Caritas visits to the Derramaderos project are continuing to search out and deal with project problems. The ADSJO project director is in close contact with the communities, and monthly meetings appear to provide adequate problem-solving opportunities.

8.5 Monitoring

The informal information processes mentioned above appear to provide the necessary information on progress but they do not constitute a monitoring system which measures progress toward predetermined inputs, outputs, and objectives. The structure of monthly meetings by project holders, the pattern of reporting, and the continuing informal contact by local CRS staff provide the basis for a shift to a simple systematic monitoring of progress toward specific indicators. Those indicators should be determined jointly at the beginning of the project. A quarterly or semiannual review process would provide the basis for effective monitoring and forward planning.

8.6 Inventories

MFP and ADSJO buy large amounts of materials to get wholesale prices. No specific information was provided on the savings they get by following this practice, however the volume of materials handled is larger than those in the other countries visited, therefore good savings are suspected. They have good warehouses for the storage of materials, pipes are not exposed to sunlight, fittings are stored in wood stands, specially constructed for this purpose. The project supervisors carry good inventory controls on those materials leaving or entering the warehouse. Evenmore, MFP has a handpump parts store, where communities can acquire materials needed for the operation and maintenance of their water systems. The amount of materials found in warehouses seems adequate.

Chapter 9

PROJECT EFFECTS

The most obvious effect was the provision of water to small, remote communities which had not previously had such immediate access.

There is increased confidence in organizational capacity. In the most successful communities this led to increased action to alleviate community problems. In others, plans were made but little accomplished. In cases in which project holders were involved in many other projects (reforestation, for example), community organization was also incorporated into these programs. There were only two cases in which community conflict appeared to be serious and prevented organizational development. Project holders were aware of these problems.

In almost all cases there was an increase in the number of persons involved in the water projects. However, there were several cases in which the water project split communities or part of a community moved ahead with the project leaving the other groups behind for reasons which were not easily determined.

The direct inclusion of latrines in the program gave an impetus to health education, and the nature of the project holders' programs appears to promise a continuing effort in this direction.

In all cases, increased water use was apparent. Such activities as bathing and hand washing appeared to depend on the amount of water available rather than health education efforts. It was also difficult to separate the effects of project-generated health and sanitary education from those provided by church groups, other CRS programs, and government efforts to increase health knowledge.

As in other countries luxury of nearby water was the dominant topic. Health and sanitary practices were said to have improved, but they varied with education, nearness to urban areas, and amount of emphasis placed by the several different sources of health information that influence the village.

Nevertheless the team attempted to classify the level of sanitary practices based on interviews, observations, and categories such as those in Table E-1.

The understanding of sanitary practices can be classified at three levels:

- Communities with a low level of knowledge;
- Communities having the ability to articulate the major factors while observations indicate that practices have not changed; and
- Communities in which both the knowledge and the practice indicated a significant change.

Most communities were in the second category, with a few in each of the other two. However, the long-term nature and diversity of health education exposure should gradually change the situation.

Water is boiled only when children are sick. There is limited knowledge of how to treat diarrhea and great dependence on the local clinic, which was often a long way from the village. Many of the villagers interviewed were not able to provide much information regarding the specific training in health education which they received. However, the level of health knowledge indicated that they had considerable exposure to health information. Insofar as it was possible to determine, some of this knowledge comes from the clinics in the nearby town, some from schools through children, some from church-sponsored health education efforts, and occasionally, from a health promoter.

As shown previously in Table E-1, it appears that there were more gains in awareness and health knowledge than in organization and participation. The diverse sources of information and training have therefore had more effect than should be expected from the amount of training reported. Therefore, it appears that the diverse sources and continuing efforts on the part of the project holders, combined with others, have made some impact on the communities. It may be that diverse and continuing exposure to health-related information is more useful than specific lectures and courses.

Including an active community-nominated health promoter in the village is an important step. In communities which had a promoter, health knowledge appears to have improved. The few communities which had a person trained by the nutrition program have significant potential.

A specific example of the most successful case is a community in Matas de Farfan which is particularly well organized. The Ministry of Health promoter was said to be well equipped and has a small supply of medicine, provides vaccines, and visits people in their homes. This appears to be a function of the accessibility of the community, the level of education, and the capacity of the community to have either the political or the organizational strength to request such services.

An extremely significant effect was the experimentation with and development of a locally-manufactured, easily repaired pump. Another was the transfer of the technology of pump construction and installation to another community.

Chapter 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 Project Development

10.1.1 Conclusions

1. The CRS-Dominican Republic approach of inserting the water projects into ongoing church-related development programs has provided an unusual degree of backstopping and support for the projects. However, it requires that CRS examine the project holder's program for proper fit as well as seeing if its project development process is adequate.

2. The support of local pump manufacture has been an innovative and effective means of promoting project accomplishment.

3. The use of in-country transfer of skills to promote well and pump projects in new communities is an important innovation.

4. The process of delegating responsibility for the initial selection process provides an inexpensive and reasonably sound feasibility assessment. However, the evaluation team found that little information on the critical factors of community organization and potential for awareness-building and health education was collected at the beginning of the projects. CRS staff states that much of this assessment is made informally and by discussions and visits.

5. The critical emotional and motivational component of church involvement cannot be overlooked. It frequently provides the basis on which dedicated community members can work together for their mutual benefit. However, in some projects this may obscure extremely difficult organizational and community problems which will appear later on.

10.1.2 Recommendations

1. Project holders should be brought together to discuss program strategy. They are capable of designing an approach to include a mix of communities which will assure both short-term achievement and long-term community benefits. Well organized communities have

shown that they provide early benefits, while others require considerable assistance before they are capable of effective action. Such a strategy can also place more emphasis on improving the health education component.

2. This process with a limited training component can also provide:

   - Some materials for more effective project selection;

   - Agreement on ways to improve implementation; and

   - Methods for improving communication throughout the project structure.

3. The Development Association at San Jose de Ocoa (ADSJO) now has a community survey form and a simple chart showing an integrated sequence of project implementation. Project holders meeting together could easily revise this material so that adequate information about technical, organization, health awareness, and participation issues could be put together on a few pages that would make clear what kind of strategy should be undertaken. For example, well organized communities could begin water and health education activities. Poorly organized communities can be given more preparation in organization and awareness with a date set for later initiation of a water project.

4. Project holders can also be assisted to find strategies to incorporate other resources within and outside the communities. CRS might provide funds for more staff at the initial stages of the projects and require project holders to train more community members for the organizational and technical aspects of the projects.

5. CRS should review the new water project at Lomas de Cabreras to determine how more in-country skill transfer can be accomplished.

10.2 Community Selection and Participation

10.2.1 Conclusions

1. The selection criteria were applied by project holders. In some cases, however, community organization issues were not examined during project selection, creating problems later on in implementation.

2. The level of service was a mixture of patio connections and standpipes which were adequately distributed, and the communities were satisfied with the arrangement. The distance to pumps, however, averaged 500 meters and should be shortened.

3. The stated CRS policy of community organization and participation as a principal objective of assistance is understood by project holders. Strong community organization or conscious strengthening efforts resulted in effective progress in all aspects of projects (e.g., Morontos and Derramaderos).

4. Community conflict is sometimes hidden by the urgent need for water and causes serious problems later in the project. In one case this was already apparent (Ranchitos) and in two others (Hierba Buena and Palos Grandes) there appears to be a potential for community division, but not enough information was obtained to determine the nature of the conflicts.

5. Most difficulties in organization resulted from a lack of analysis of organization capacity prior to the initiation of the project.

6. The possibility for sustained participation was related to the capacity of the community leaders and the project holders to broaden the leadership base and promote new interest groups in the communities.

7. The more successful communities exhibited greater participation of women in project planning and implementation.

10.2.2 Recommendations

1. A handpump well should serve fewer than 200 persons and the maximum distance to the water source should be 100 meters. Project holders should provide water systems with public standpipes located at a maximum distance of 100 meters from users. If the community desires patio connections, it should pay the difference in cost.

2. CRS should review the pump program to determine how more local skills can be developed and the distance to pumps reduced.

3. CRS should work with project holders to develop project selection procedures which clearly identify the organizational problems prior to community selection.

4. Project holders should encourage the formation of additional interest group community organizations, particularly a women's group. This should reinforce support for the water project and enhance both organizational development and participation.

10.3 System Design and Construction

10.3.1 Conclusions

1. In the Dominican Republic, CRS has taken a very different approach to the matching grant program. CRS does not get involved in design, construction, or operation of the projects. A consulting engineer is hired in case of conflict in the understanding of the project feasibility study. CRS does not therefore have its own design standards. They were left to the three different project holders: Las Matas de Farfán Parish (MFP), Consejo Comunitario Derramaderos (CCD), and Asociación para el Desarrollo de San José de Ocoa (ADSJO). MFP has its own set of design criteria which have evolved from experience gained by working with communities and have been adapted to reflect the economic constraints within which they are working. The Los Derramaderos and ADSJO water projects are designed by engineers from INAPA, who use INAPA design standards.

   Interviews with INAPA engineers were held to discuss the adequacy of the standards to reflect CRS's funding approach. It was agreed that some modifications may need to be done on the water consumption factor and on the design period because they seem inadequate.

   The design period may be excessive. By using a 20-year design period, the system is being designed to supply water to a non-existent population. This increases the cost of a project and prevents other communities from receiving the present benefits of a water supply system.

   Storage capacity, pipe sizing, and location of air relief valves, drain valves, and pressure break chambers follow design criteria and seem to operate well. Neither complaints on air accumulation in pipelines nor plugging of lines were reported.

2. Appropriate technology is generally used. Hand pumps, hand-augers, pick and shovel, gravity flow systems, latrines, etc. are good technologies. How- ever, more technologies are still available that can be used to take better advantage of the specific conditions in the Dominican Republic. Wind power, solar energy, simple treatment processes, and hydro rams are some of the technologies still not used on water projects.

3. Present drilling methods of dug wells may be less than adequate. It is understood that digging a well takes from nine months to more than a year. In this case human resources can be better utilized for fighting the real problem -- deforestation -- instead of the dangerous and time-consuming practice of digging wells. The use of the hand-auger rig is not appropriate for the kind of soils (stones and boulders) generally found in the Matas de Farfan region. A discussion of different drilling methods is presented in Annex 4.

   Intake structures, storage tanks, river crossings, and patio connections are in general well constructed. In a few cases, inadequate river crossings and exposed PVC pipe were observed.

   Supervision during construction appears to be adequate with CCD and MFD, but weak with ADSJO. Storage tank covers were not finished in Los Naranjos and Hierba Buena. Water should not be provided to the community until all the construction details are finished because once they start receiving water these details are forgotten.

   Pipe joint installation is excellent in all of the communities visited. This is exceptional because most of the projects in other countries visited by the evaluation team experienced joint problems.

4. Water from the water projects is of better quality than that from the old sources but still may be far from optimal. However, the exact quality is unknown because water quality analysis of water sources is not practiced. Physico-chemical and bacteriological tests are never conducted.

   Field observations, experience, and information gathered from users indicate that the quality of water delivered to the customer in some cases is inadequate. Water sometimes contains soil, debris, floating matter, and frogs. This condition is likely to prevent its usage and it is a threat to the health of consumers, especially because communities do not boil their water.

5. Water availability has been greatly improved with the construction of the water projects. Quantities of water available for the communities are in general adequate. Only one of the communities, Derramaderos, served by gravity flow systems, reported a water shortage problem. In this case the community knew well in advance that they were going to have this problem. Almost all taps visited did not leak water. Water committees seemed to be very aware of water conservation. Water is used for drinking, cooking, food washing, dish washing, laundry, and bathing, except in Derramaderos where water is used only for drinking and cooking.

   In some of the MFP projects water availability is scarce. From 67 wells installed, 15 went dry and 52 are still operating. Better techniques are needed to locate, drill, and develop groundwater resources.

6. MFP usually chlorinates the wells before they are turned over to the community (see Annex 5 for information on disinfection). Only on a few occasions is this not practiced -- because of the lack of chlorine. Water quality control is not practiced by either CCD or ADSJO. Neither chlorination of distribution systems nor pressure tests are conducted prior to usage.

7. There is a sanitation component in this program. However, it is not undertaken at the same time as the water project, but rather after the water system is installed. The sanitation component includes efforts to build awareness and understanding and to encourage communities to request, install, and use latrines. Some communities had installed a few latrines, supplied by the Health Ministry, but for the most part residents still rely on open field defecation. In general, latrines found were of conventional design. Latrines had odor and fly problems, which likely prevent their use.

   Construction cost of latrines in San José de Ocoa is high -- RD 133.00 (US $42.90), compared with RD 35.70 (US $11.51) at Las Matas de Farfán. The reason is that the design of the San José de Ocoa latrines calls for the use of zinc material on walls and roof, which costs RD 103.60 (US $33.41). This is over-design: appropriate regional materials could be used in place of zinc without hampering the functioning of the latrines. Apart from this, latrines seemed to be well designed. Depth, capacity, and location are adequate. Effects on groundwater are impossible to predict because types of soils are not well recorded and vary from place to place.

8. MFP has a good handpump design. The pump is able to lift water up to 50 feet and pump capacity varies from 1 to 4 gallons per minute. It has few parts and it is economical (a 15-foot pump costs around RD 200, compared with the Santo Domingo pump which costs RD 900). The supporting structure needs improvement, especially the drainage system. Puddles are formed beside the concrete slab and sometimes drain back into the dug well.

   CCD and ADSJO have good designs for the water systems. Pipeline routes and the location of storage tanks were well selected. Pipe material selection was generally adequate. In only one instance was a water faucet located away from a house due to insufficient pressure at the house elevation. A more detailed analysis is needed to determine if a better location of the storage tank would solve this problem. Only a few problems were found; for example, in Los Naranjos and Hierba Buena, the intake structures are not well located and some segments of pipelines are exposed. Also, vent pipes are not provided in storage tanks. Intake structures are uncovered, hence a high potential for pollution of spring water exists. Water pressure and the amount of water delivered are excellent.

9. The distance to water has been shortened, but well location may still be too far away from users. Information indicates that mean user distance is around 500 meters.

10. The water supply systems were of a very simple design. Storage tanks have not been designed (except in CCD) to allow for water to be bypassed during tank maintenance; this is a shortfall.

    Overall reliability of the systems to provide water is adequate.

11. Surface water is scarce and groundwater resources are poorly mapped in the Las Matas de Farfán and Derramaderos regions.

10.3.2 Recommendations

1. CRS should continue its project approach, leaving the project holders to do the design, construction, and operation of projects. Project holders should develop their own design standards to better reflect CRS's funding approach. They should analyze and correct, if deemed necessary, the design period and water consumption factors. Water meters could be installed at storage tanks in those water systems built in this program with no water-shortage problems. This would assist in determining an accurate water consumption factor for the design of future water systems. It is understood that INAPA is conducting a similar water consumption study; information from this study should be obtained and analyzed.

2. The handpump experience should be transferred to other communities and countries.

3. Cable tool percussion should be used to drill water wells. This is the best method available for the conditions found in the Dominican Republic. It takes less than three days to drill a well 50-60 feet deep.

4. Proper location of the storage tank should be provided to ensure that most, if not all of the community is provided with a constant water supply.

5. PVC pipe exposure to sunlight and to external loads should be minimized. Pipe in river crossings should be protected by using galvanized casing. Pipe laid on rocks should not be left uncovered. A mixture of cement and soil or galvanized pipe casing should be used to cover it.

6. Project supervision should be as close as possible. The project supervisor should have a specific and frequent schedule and be available to community counterparts or local people, as required.

7. A community counterpart to the project supervisor should be chosen from the members of the committee. This person should be trained to fully understand the whole project. In the absence of the project supervisor, this person would be able to make decisions. (In some cases, committee presidents now take this role.)

8. Water quality should be checked during both dry and rainy seasons, not only during the design phase but during construction and operation. During operation, water should be tested at the source and at the tap.

Bacteriological and aesthetic quality should be the main concern. Physico-chemical tests should be undertaken less frequently, perhaps once a year. Portable test kits can be used to do both bacteriological and physico-chemical testing.

9. Slow filtration is recommended where bacteriological quality does not meet the recommended limits (10 coliforms/100 ml).

10. Simple water analysis kits should be acquired. This should be included in the budget. Also included should be the collection and analysis of samples during the operation of the system.

11. Groundwater resources are scarce in Las Matas de Farfán and Derramaderos regions. Groundwater resource capabilities are unknown; no well deeper than 300 feet has been drilled in these regions. The need for groundwater is urgent. A serious groundwater exploration study is needed (see Annex 6 for suggested approaches). The approach should include any of the following steps:

    - Study of any available geological maps and reports
    - Study of topographical maps
    - Examination of any existing wells
    - Hydrogeological survey
    - Geophysical investigations, and
    - Drilling of test wells.

12. The sanitation component should be provided to those communities which have benefited from the water program. Selection of latrines should consider all physical constraints, such as water availability, depth to groundwater, etc. The VIP latrine is recommended; this latrine, when properly installed and maintained, eliminates odor and fly problems. Vent pipe should be installed at the sunny side and should be painted black. Supervision should be given during the construction of latrines. Proper usage and maintenance should be taught during construction. Use of either ash or lime to prevent offensive odors should be encouraged.

13. Other technologies should be studied to take greater advantage of the indigenous resources available in the Dominican Republic. Wind electrical generators should be seriously studied for use in pumping systems. At Derramaderos, there is a good potential for the use of this technology. At San José de Ocoa, electrical generators could be placed at perennial streams. Sand deposits should be located and used to store water for the dry season.

14. The outside structure of the handpump system should be improved; the delivery pipe should be extended to avoid water splashing on the pedestal. The drainage system should be extended away from the concrete slab.

15. Water intake structures should be located as close as possible to the spring wall. Trenches should be excavated to capture groundwater before it comes to the surface. All trenches must be made impermeable on both the bottom and the downstream side and should be directed to a collection channel which ends in the water intake structure. Intake structures should be covered with a concrete slab; a lightweight access should be provided for cleaning and maintenance of the structure. Vent pipes, overflow pipes, and drainage pipes should be provided. The drainage pipe should be of a size that ensures the complete evacuation of water.

16. Vent pipes and bypassing should be provided to storage tanks. A water faucet should be installed upstream of the gate valve in the influent line at the storage tank. This arrangement will help with the cleaning operation of the tank and the irrigation of lawn in the facility.

17. Pipe material, pipe protection, and water quality should be considered during the design. Water from springs may be corrosive and may affect galvanized pipe and the quality of water.

18. Water quality control should be enhanced. Chlorination to clean pipelines, storage tanks and intake boxes should be practiced. Pressure tests in distribution systems should be conducted after installation and before backfilling the trench.

10.4 System Operations and Maintenance

10.4.1 Conclusions

1. Operations and maintenance problems have been minimized by the simplicity of the water and sanitation projects. Handpumps are simple to repair -- several cases of repair were observed during the visit.

2. The training program is excellent; use of audiovisual equipment for training is a plus. Also, the community takes an active role in the assembly of the pump during construction.

3. Water system operators appear to be knowledgeable in the operations and maintenance of the water system. In several instances they have already fixed broken pipes. Maintenance of the system is carried out by the whole community. The water committee also schedules members of the community to clean the water storage tank and the intake structure.

4. The stock of materials left for operations and maintenance is not adequate. Communities reported lack of spare pipe, glue, and washers. In the case of Las Matas de Farfán, tools are left for O&M and materials can be acquired through the parts shop. This parts shop has been created to assure the good functioning of the water projects.

5. No problems are foreseen to prevent systems from operating for 20 years. The systems visited are new; they have been in operation, at the most, for 1.5 years. They have not had a great deal of tuning up. Some of the pipes exposed need to be buried or relocated, but, in general, construction is solid and well finished.

6. Inadequate drainage around taps was observed in some communities. Puddles are formed which create potential mosquito breeding sites. This may have a detrimental effect on the health of villagers. It was reported that at least at Las Matas de Farfán, malaria cases occurred last year (though not necessarily from this puddle problem). This disease has a very high economic impact on rural areas because an infected villager needs about three months to fully recover.

7. Regular chlorination of tanks and pipelines and flushing of lines is not conducted.

10.4.2 Recommendations

1. A maintenance program should include chlorination of storage tanks and flushing of lines. Flushing devices should be installed at dead ends.

2. Provision should be made during planning of the budget to ensure that a good stock of supplies, such as pipe, glue, washers, etc., is left in the community.

3. Project holders should continue training members of the community in the construction and O&M of the system and on methods for obtaining better quality. Operators should be encouraged to participate by presenting technical papers on experience gained during the operation of the system. Prizes should be given to persons presenting new ideas.

4. An operations and maintenance manual for water systems and handpumps should be prepared.

5. Water samples from taps and sources should be taken and analyzed regularly.

10.5 Human Resources Development

10.5.1 Conclusions

1. The quality and dedication of CRS and project holder staff and community workers were uniformly high. The use of Peace Corps Volunteers has been an important addition to project implementation, as has the use of short-term personnnel for advice and evaluation.

2. The combination of on-the-job training and some local residential training by project holders has been effective and is a continuing activity.

3. Nutrition program training made a useful contribution to project accomplishments in those communities participating.

4. Incorporating the school and the teachers in project development and implementation processes is an effective means of increasing local resources.

10.5.2 Recommendations

1. CRS should encourage project holders to increase the training component in their own programs.

2. CRS should encourage project holders to incorporate available human resources (Peace Corps Volunteers, etc.)

3. More coordination with the nutrition program will increase the training component and provide long-term community benefits.

10.6 Health, Sanitation, and Water Use Education

10.6.1 Conclusions

1. The program incorporates a latrine program in most of its activities or follows up with one where it was not included. Such a program requires a stronger health education component.

2. Communities do not understand the need to select and train local health promoters, since community members use health clinics even though they are distant.

3. In spite of limited water use and health education, community members were able to articulate some sanitation and health knowledge, but observations did not confirm a follow-through in practice. This may be due to longstanding health and sanitation efforts throughout the country.

10.6.2 Recommendations

1. CRS should encourage and assist project holders to better use the personnel and materials available for health education.

2. CRS should assist project holders in strengthening their sanitation and health education programs by training more local promoters and utilizing the resources of government clinics and local promoters.

3. Follow-up efforts to promote the use of latrines should be conducted by the project holders.

10.7 Administration and Management

10.7.1 Conclusions

1. General management and the continuing, information relationships between CRS and the project holders provide effective information on and control of the projects.

2. The use of monthly meetings, zone coordinators, and community councils by project holders is an innovative and effective method of managing and monitoring project implementation and coordination at the project holder level.

   The costs of the projects are low and the benefits, now adequate, can be increased with very small increases in expenditures.

3. Coordination by CRS is accomplished reasonably well with both national and donor agencies.

4. The reporting and monitoring process benefits from the strong informal ties with project holders and communities. There is no monitoring system that measures achievement against targets.

5. Both CRS and project holders made significant efforts to shift greater management responsibilities to communities. More training is needed in some cases. However, the increase in community responsibility was significant and in some cases remarkable.

10.7.2 Recommendations

1. Project holders have diverse management systems. CRS could improve the situation by bringing them together to share information and combine their efforts.

2. CRS should encourage project holders to increase the time spent in monthly meetings on discussion of community problems and management issues. They could be more structured and incorporate group techniques to gather and combine basic information in a form for useful problem solving. Meetings should emphasize small achievable targets agreed upon by the community and the project holders.

3. The CRS pattern of information visits and discussion is an important technique. The listing of essential indicators of progress agreed upon at the initiation of the project could make reporting easier and more accurate.

10.8 Project Effects

10.8.1 Conclusions

1. CRS Dominican Republic water projects have made a small but important contribution to the programs of the project holders it has been assisting. Individual committees have benefited through their own efforts in their access to water and, to varying degrees, in their organizational capacity and increased health awareness and knowledge. More important, the program has demonstrated the strengths and weaknesses of several different strategies for water projects that can now be expanded and applied more effectively.

2. Communities which have made significant progress in the program have:

   a. Had the capacity to analyze their own situations;

   b. Developed confidence and initiative from accomplishments;

   c. Incorporated more people into active participation; and

   d. Gradually assumed responsibility for community activities.

3. One unintended effect was the exacerbation of community conflict which, though rare, was indicative of the need to examine organizational factors in the project selection process.

4. The in-country transfer of skills resulting in a new well program has created confidence and opened new opportunities for expanding the water projects.

ANNEX 1

Dominican Republic Projects
Under the USAID/CRS Program

DOMINICAN REPUBLIC PROJECTS
UNDER THE USAID/CRS PROGRAM

	Name	Type	Total Cost	CRS Cost	PCTG.	Benef. Pres.	Benef. Design	T. Cost/ Capita
1.	Las Matas	WHP	$126,234.28	$ 68,454.50	54.23%	9,055	14,850	$13.94
2.	San José	GH	28,227.43	21,903.39	77.60%	500	820	56.45
3.	Loma De Cabrera	WHP	61,966.67	41,108.61	66.34%	3,000	4,920	20.66
4.	La Vereda	GH	18,303.55	14,758.55	80.63%	900	1,476	20.34
5.	Los Derramaderos	GP	13,392.50	10,481.00	78.26%	1,650	2,706	8.12
	Sub Total		**$248,124.43**	**$156,706.05**	**63.16%**	**15,105**	**24,772**	**$16.43**
	Technical Studies		$ 5,000.00	$ 5,000.00	100.00%			
	Evaluation Program		$ 2,000.00	$ 2,000.00	100.00%			
	GRAND TOTAL		**$255,124.43**	**$163,706.05**	**64.17%**			
	Averages		$ 49,624.89	$ 31,341.21	71.41%	3,021	4,954	$16.89

Notes:

G = Gravity System
H = Household Connections
P = Public Standposts
WHP = Wells with Handpumps

ANNEX 2

Photographs

Photo 1. Public standpipes are accepted by communities - Derramaderos.

Photo 2. Appropriate drilling equipment is needed.

Photo 3. Handpump desıgn is improving - Matas de Farfan.

Photo 4. Water carriage is often done by children.

Photo 5. Some pumps are broken and not repaired - Matas de Farfan.

Photo 6. Community reviewing O&M training on handpumps - Matas de Farfan.

Photo 7. Water is collected from any source.

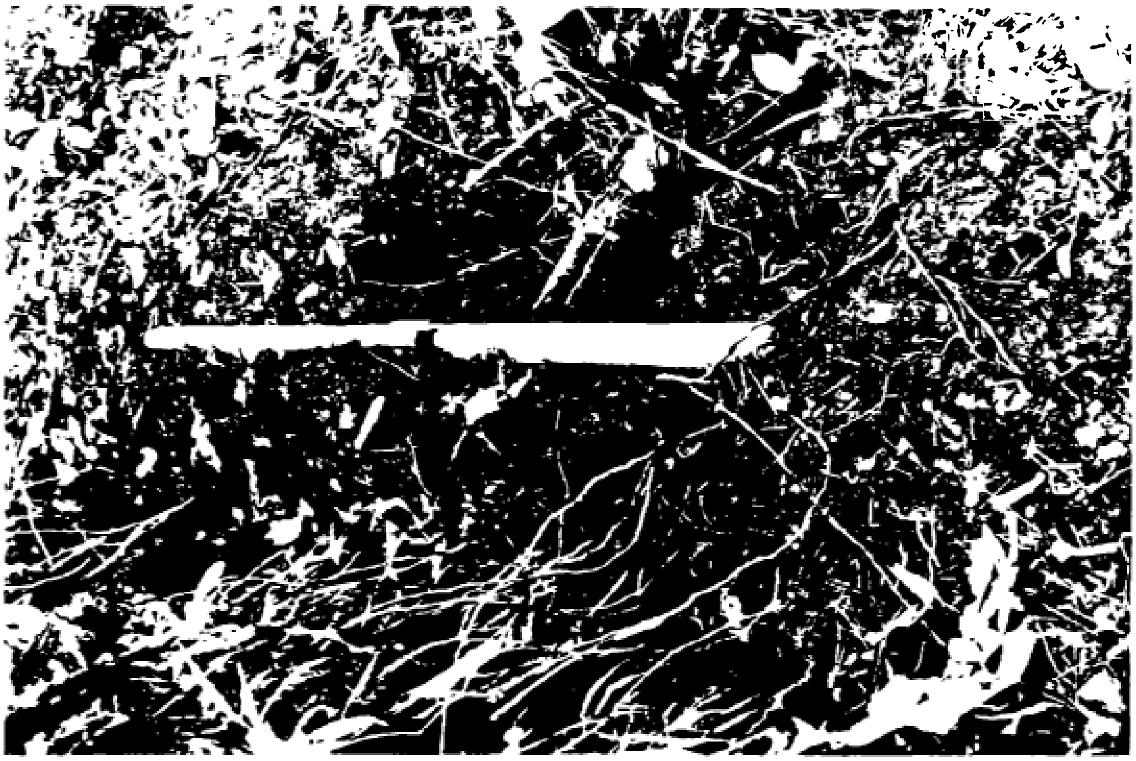

Photo 8. Pipeline exposed in some places, due to inadequate supervision - San Jose de Ocoa.

Photo 9. Improper drainage forms water puddles - Derramaderos.

Photo 10. Construction of storage tank - San Jose de Ocoa.

Photo 11. Rainwater catchment is practiced - Derramaderos.

Photo 12. Storage of water is still practiced in some communities - San Jose de Ocoa.

Photo 13. Water is closer to the community. Health education is still needed. Notice the old can used to catch clean water - Sabana Tuna.

ANNEX 3

Key Individuals Contacted

KEY INDIVIDUALS CONTACTED

CRS

Lynn Renner	CRS Representative
Mary Millan	Project Officer
Monica Maher	Intern

CATHOLIC CHURCH

Father Brian Kennedy	Parish of Matas de Farfan
Father Louis Quinn	Executive Director of the Development Council, San Jose de Ocoa

PEACE CORPS

Patrick Raycroft	Volunteer - Las Matas de Farfan

LAS MATAS DE FARFAN

Hector Ogando	Social Promoter
Jose Fernando Diaz Maceo	Project Director

ANNEX 4

Water Well Drilling Methods

WATER WELL DRILLING METHODS

This is an attempt to present a very brief discussion of some of the well drilling methods available. Even though that it is believed that the best method available is the cable tool method, because of its simplicity and applicability to the general geological conditions of Las Matas de Farfan, we will discuss other methods.

Cable Tool Percussion Method

This method carries out the drilling operation by lifting and dropping regularly a heavy string of drilling tools in the borehole. The drill bit breaks or crushes hard rock in small fragments. When working in soft, unconsolidated rocks, the drill bit loosens materials.

Hydraulic Rotary Drilling

Hydraulic rotary drilling consists of cutting a borehole by means of a rotating bit and removing the cuttings by a continuous circulation of a drilling fluid as the bit penetrates the formation materials. Two general types of bits are used -- the roller type usually called a rock bit, and the drag type of either the fishtail design or the three-way design. Roller-type bits exert crushing and chipping action, making it possible to cut hard formations effectively. Drag bits cut rapidly in sands and clays, but do not work well in coarse gravel or in rock formations. Two main disadvantages of this method are its need for continuous operation once the well is started and the need for a source of water.

Reverse Circulation Drilling

Reverse circulation rotary drilling is done with the flow of drilling fluid reversed as compared with the system used in the conventional rotary method. Reverse circulation offers the cheapest way for drilling large diameter holes in soft, unconsolidated materials. Most of the wells drilled by this method are 24-inch artificial gravel packing. Conditions that favor the use of reverse circulation method of drilling include: sand, silt or soft clay formations; absence of clay or boulders; static water level 10 feet or more below ground. Conditions that limit the use of this method are: static level too high; lack of water supply to make up loss of drilling fluid; stiff clay or shale formations; considerable amounts of stones or boulders.

Jet Drilling

There are two methods for installing wells in which the jetting stream of water more or less characterizes the operation. One of these may be described as a jet-percussion method. In this method, water is pumped under moderate to high pressure through the drill pipe and issues from the drill bit. The drilling water then flows upward in the annular space around the drill pipe carrying the cuttings in suspension. The drill rods are rotated by hand to make the bit cut a round hole. With the water maintained, the drill rods and bit are lifted and dropped in a manner similar to cable-tool drilling but with shorter strokes. The chopping action of the bit combined with the washing action of the water jets opens the boreholes.

At present time, use is limited largely to drilling 3-inch and 4-inch wells to depths of about 200 feet. This method can be used to penetrate some sandstone and schist formations that are not too hard. Common use is for drilling small diameter wells in water-bearing sand.

Hydraulic-Percussion Method

This scheme of drilling employs a string of drill pipe or drill rods similar to that used in the jetting-percussion method. Drilling is done by lifting and dropping the drill rods and bit with quick, short strokes. As the bit drops and strikes bottom, water with cuttings in suspension enters the ports of the bit. When the bit is picked up, the ball check closes and traps the fluid inside the drill pipe. Continuous reciprocating motion produces a pumping action to lift the fluid to the top of the string of drill pipe where it discharges into a settling tank. Its use is limited to drilling only small diameter wells through clay and sand formations that are relatively free of stones or boulders.

Rotary Bucket Drilling

This method involves excavating material to sink the borehole by use of a large diameter auger bucket. The material being excavated is collected in a cylindrical bucket which has auger-type cutting blades on the bottom. The bucket is lifted from the hole and dumped in the surface. Rotary bucket drilling of water wells has found primary application in areas of clay formation that stand without caving until the borehole is drilled and pipe is installed to serve as well casing. Drilling in sand below the water table is difficult, but recently it has been found possible to overcome some of the difficulty by keeping the hole full of water at all times. A considerable supply of water may be needed if the sand formation is quite permeable. Stones and boulders cause much difficulty.

Auger Method

This method uses a continuous flight, spiral auger. An auger stem is turned by a rotary drive-head which is mounted on a hydraulic-feed mechanism that can push the stem down or pull it back. The auger diameter is four to six inches. This method is limited to drilling through formations containing enough clay so that the borehole will stand for a time without caving. When the auger encounters saturated sand the auger flight will no longer carry material upward, so drilling cannot be continued below the water table.

Air Rotary Drilling

Rotary drilling equipment using compressed air as the drilling fluid, rather than the drilling mud, represents a modern development within the water-well industry. Air moving at high velocity in the annulus carries cuttings to the surface or blows them out into rock crevices. Drilling with air as the drilling fluid can be done only in consolidated materials. Rate of penetration in several types of rock is faster by the use of other methods and other types of tools.

Driven Wells

Driven wells can be installed only in soft formations which are relatively free of stones or boulders. Well points are commonly driven to depths of 50 ft, and to even greater depths in favorable situations.

ANNEX 5

Disinfection of Wells

DISINFECTION OF WELLS

Disinfecting a well will kill the bacteria present in the well or on the pumping equipment. However, if there is some external source of contamination, the problem will be solved only temporarily by a single application of chlorine solution in the well.

An effective and economical method of disinfecting wells, springs, etc., is by the use of calcium hypochlorite (chlorinated lime) containing approximately 25 percent available chlorine. Note: a fresh supply should be used, since the chemical deteriorates by standing in air. To the amount of chlorinated lime specified in the table below, add small quantities of water and stir until smooth and there are no lumps. Add from 5 to 20 gallons of water to the paste and stir. Liquid containing the chlorine should be used and the inert material or lime that has settled should be discarded. Prepare the solution in a clean container. Avoid using a metal container since it may be corroded by the strong chlorine solution. If small quantities of chlorinated lime are required and no scales are available it may be measured with a spoon. One moderately heaping teaspoon of chlorinated lime weighs approximately once ounce.

Capacity of well or spring in Gallons	**Ounces of chlorinated lime to be used**	**Gallons of water to use in making solution**
50	1.5	5
100	3	5
200	6	5
300	9	5
400	12	5
500	15	5
1,000	30	10
2,000	60	15
3,000	90	20

The steps to follow in disinfecting a drilled or bored well are as follows:

1. Well must be pumped until water is as clear and free from turbidity as possible.

2. After removing the test pump, pour the required amount of chlorine lime solution into the well slowly just before installing the final pump. Use a hose or pipe to mix the solution or use dry ice.

3. Wash the outside (and inside if possible) of the pump cylinder and drop pipe as they are lowered into the well.

4. After the pump is in position, operate it intermittently for very short periods to further mix the solution in the well and wash the inside of the pump.

5. After the chlorine solution has been mixed and has circulated through the pumping system, allow the solution to remain in the well for 10 hours.

6. After at least 10 hours have elapsed, the well should be cleaned by pumping. Operate pump until water is free from the odor of chlorine.

ANNEX 6

Geophysical Exploration Techniques

GEOPHYSICAL EXPLORATION TECHNIQUES

Geophysical exploration involves the measurement of physical properties of the earth's crust. Geophysical data are interpreted in terms of geological structure, type of formation, porosity, water content and conductivity of the water. Geophysical measurements do not confirm the presence of fresh water but they provide information which interpreted correctly together with geological information, may lead to suitable locations for the drilling of wells. Several techniques are available: electrical resistivity method, seismic refraction, aerial photography and satellite imagery.

Electrical Resistivity Method

Resistivity measurements are made by passing an electric current through the ground between two electrodes and measuring the voltage drop between two other electrodes. Differences in resistivity can indicate the location of permeable strata because materials with a low permeability such as clay, have low resistivities, and highly permeable strata such as sands and gravels tend to have much higher resistivities. Resistivity probes can, under suitable conditions, go as deep as 300 m or more. Most of the wells that are drilled for water supply purposes are not deep, i.e., less than 40-50 m. Resistivity surveys for this type of well can be carried out easily with equipment using only a small amount of power.

Seismic Refraction

In this technique, seismic waves are initiated by striking the ground surface with a sledge hammer or by firing an explosive charge (e.g., dynamite). The time required for the resulting shock wave to travel known distances is measured. This time depends on the geological formations through which it passes. Wave velocities are lowest in unsaturated, unconsolidated sediments.

In saturated zones, they increase markedly. The more consolidated the material, the higher the velocity. The highest valves are recorded in solid igneous rocks.

Aerial Photography and Satellite Imagery

Pictures taken from aeroplanes or satellites can provide useful information about groundwater resources and conditions. In addition to conventional black-and-white and color photographs, the technology and application of remote sensing techniques such as infrared photography, multispectral and thermal infrared scanning have expanded rapidly in recent years.

Satellite imagery is useful in the study of spring discharges and seeps in arid or semi-arid regions, where the appearance of unusually abundant vegetation in sparsely vegetated areas indicates the presence of groundwater.

Subsurface Investigations

Test well drilling gives information on the thickness and composition of geological formations. Numerous instruments and techniques are now available for special investigations in groundwater conditions. Logging can be lowered into a well on a cable and the measurements and other data recorded at the surface by electrical means. Some of the many instruments now in use, together with some of their uses, are discussed below.

1. Standard Electrical Log

   It is used to determine geologic conditions in uncased holes such as distinguishing shale, sandstone, limestone, etc.; and to determine zones of high or low permeability. Two curves -- potential and resistivity.

2. Caliper Log

   It measures hole diameter at any depth; useful to locate large casing breaks; to determine size and position of casing and liners; to locate caving shales, cavernous limestones, etc.

3. Temperature Log

   It measures water temperature at any depth; useful in locating sources of flow, casing leaks, etc.

4. Radioactive Log

   It is similar in use to standard electrical log but can be used inside of casing as well as open hole.

5. Water Sampler

   It permits collection of water samples for analysis from any depth in the well.

WASH