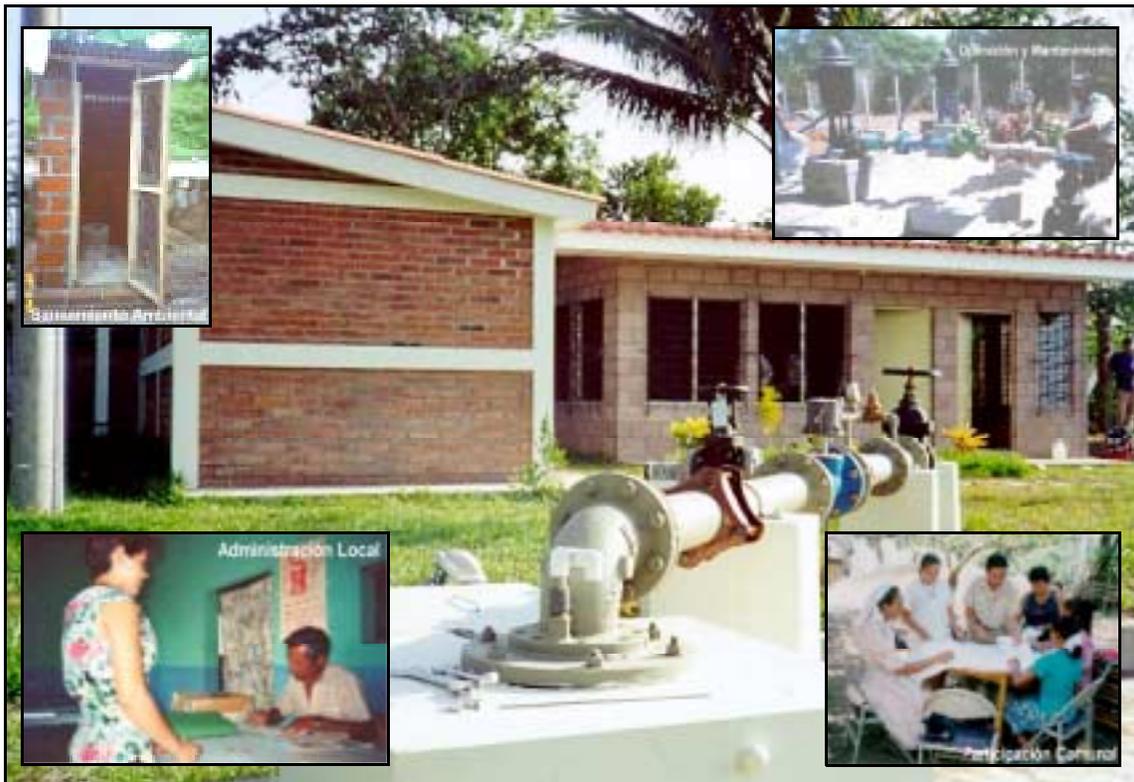




POTABLE WATER AND SANITATION AN EXPERIENCE TO SHARE



PERFORMED FOR CARE INTERNATIONAL IN EL SALVADOR AS PART
OF THE PROGRAM HEALTH THROUGH WATER AND
SANITATION - PROSAGUAS, FINANCED BY USAID

POTABLE WATER AND SANITATION AN EXPERIENCE TO SHARE

DIAGNOSIS PERFORMED IN 55 WATER AND SANITATION SYSTEMS BUILT BETWEEN 1993 AND 1997, WITH USAID'S FUNDS, THROUGH AID PROJECTS No. 519-0320 AND AID No. 519-0394

PERFORMED FOR CARE INTERNATIONAL IN EL SALVADOR AS PART OF THE PROGRAM HEALTH THROUGH WATER AND SANITATION - PROSAGUAS, FINANCED BY USAID

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San Salvador, 1999

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EXECUTIVE SUMMARY

1

This document presents the results of a research on the current situation of fifty-five potable water and rural sanitation systems, built by three institutions¹ with funds provided by USAID through projects No. 519-0320 and 519-0394, which are being managed mainly by the beneficiary communities. The choosing of the researched systems had as reference the one hundred per cent of the systems with piped water and wells with hand pumps used in homes; plus a random selection of six systems with wells and hand pumps of community usage. The purpose of the study was to identify the systems that need technical assistance in order to solve critical problems that are influencing the systems' above mentioned sustainability. Their sustainability refers to the ability of supplying a proper level of benefits during an extended period of time, with a minimum of external technical assistance, after the main assistance provided during the physical execution of the systems has ended. This depends mainly on the functioning, usage and management of the systems by the community; of the technology implemented and the environment.

Of the 55 systems researched, 28 have electro-mechanical pumping, 18 by gravity, 3 with hand pumps in homes, and 6 have hand pumps for communal use. Of this same universe, 10 were built by CREA, 22 by PCI and 23 by CARE; 5 were rehabilitated, and 50 are new systems. These systems were implemented during the period starting in 1993 through 1997, and were subject to the funds available from donors, an adverse situation for a regular program of water and rural sanitation.

The approximate number of homes that are currently using the researched water systems is 10,316 (approximately 56,738 people). Of these homes, 9,340 receive water through pipes; 766 from wells with hand pumps used in homes; and 210 from wells with hand pumps used by the community.

The purpose of the study was to identify the systems that need technical assistance in order to solve critical problems that are influencing the water and sanitation systems' sustainability.

¹ Project Concern International (PCI); Creative Associates International Inc. (known locally as CREA International); and CARE International in El Salvador

The amount invested by USAID in those systems was US\$19.3 million, of which 7.9 million were invested through CARE during the years 1993 and 1998; 6.7 million through CREA International during the years 1993 and 1996; and 4.7 million through PCI during 1993 and 1997. With these investments, approximately 130,384 people were benefited with potable water and/or sanitary infrastructure in rural areas and in small urban communities of El Salvador.

Access to potable water and sanitation, as means of improving the population's standard of health —very deficient in this sector of the country, was the spirit in the provision of these types of systems in rural areas. This in order to provide them with more opportunities and consequently, a better quality of life. However, it is not enough to provide water systems and sanitation, it is also necessary that the beneficiaries care for and provide maintenance for them in order to extend their useful life beyond their period of design (20 years). In this sense, the communities need not only to receive material benefits, but also intangible ones to help them build the abilities on decision making and management that they need to put into practice.

The communities were trained to manage their systems with sustainability criteria. Thus, the success in providing the systems is that the communities be able to manage them with the minimum technical assistance. According to the information gathered, 100% of the beneficiary communities were trained with this purpose in mind. However, the local management of systems is a new concept in El Salvador and it means a learning process for both the community in regards to operations, and for the facilitating institutions regarding the lessons learned that may enrich their technical assistance for future interventions.

It was found that the decision making and management performed within the communities regarding the operation, management and maintenance of the systems are based on three approaches:

THE COMMUNITY APPROACH. This has been determined by agreements reached by the members of the community, during general assemblies. Important and global issues that define the community's development are decided here.

THE MANAGEMENT APPROACH. It refers to the performance of all those activities geared towards maintaining the workability of the systems through the implementation of processes and regulations that involve the users; role that belongs to the managing bodies trained for that purpose. These have to make decisions and perform the needed actions in order to provide a good service to their customers (users).

THE DOMESTIC OR USER APPROACH. It refers to individual or family activities that can affect the caring and maintenance of the systems. The users' attitudes and behaviors determine those activities, such as: payment for the water service or neglect of domestic hygiene that may affect the neighbors, etc.

In summary, the systems' sustainability -according to any of the approaches found- is determined by a set of several decisions and actions taken, made possible through active community participation. This community participation translates itself into social and administrative behaviors that influence the system's sustainability, as well as in other aspects related to the technology provided and the environment. In consequence, this research analyzes the current situation of the systems through three components: administrative or managerial, social and technical. The environmental component, in spite of its importance, is not included in the research since this was not part of the programs when they were executed.

For the administrative part, all actions performed by the body in charge of management were taken into account. The analysis goes through its way of planning, execution, coordination and control of the systems' administrative and operative processes.

The social factors researched are related with the level of local management fostered by the general management of the systems and of the rural sanitation. The entire management performed by the community shows general administrative indicators such as the decision to increase rates when it is required; change of board; search of funds to improve the system, etc. Sanitary conditions are analyzed based on the community's sanitary conditions, not at home level, since it is not enough for a neighbor to practice habits of hygiene but also that his/her neighbors also do it.

The systems' sustainability is determined by a set of decisions and management actions, expressed through active community participation. All participation is performed within a sheer administrative and social environment

In consequence, this research analyzes the current situation of the systems through three components: administrative or managerial, social and technical. The environmental component, in spite of its importance, is not included in the research since this was not part of the programs when they were executed.

In the technical component, the type of technology chosen is analyzed from a social and technical view, as well as its installation so that it does not represent an obstacle for the community's good managerial performance.

The diagnosis found at the moment of the research (June through October of 1998), that of the fifty-five systems researched, fifty of them are in service and five are out of service.

In order to facilitate the presentation of the results, the findings have been associated in five sections. The grouping is related with the type of indicator, system, management and operational situation at the moment of the research. Such sections are referred to:

- ✓ The impact indicators researched in the 55 systems
- ✓ 36 systems -with electro-mechanical pumping and gravity- that are providing a service and are being managed by the beneficiary communities;
- ✓ 6 systems -with electro-mechanical pumping and gravity- that are not being managed exclusively by the communities (2 managed by ANDA², 1 by the municipality, and 3 jointly by community-municipality);
- ✓ 8 systems with wells with residential and community usage hand pumps that are managed by the communities; and
- ✓ 5 systems out of service (4 by electromechanical pumping and 1 with community usage hand pumps).

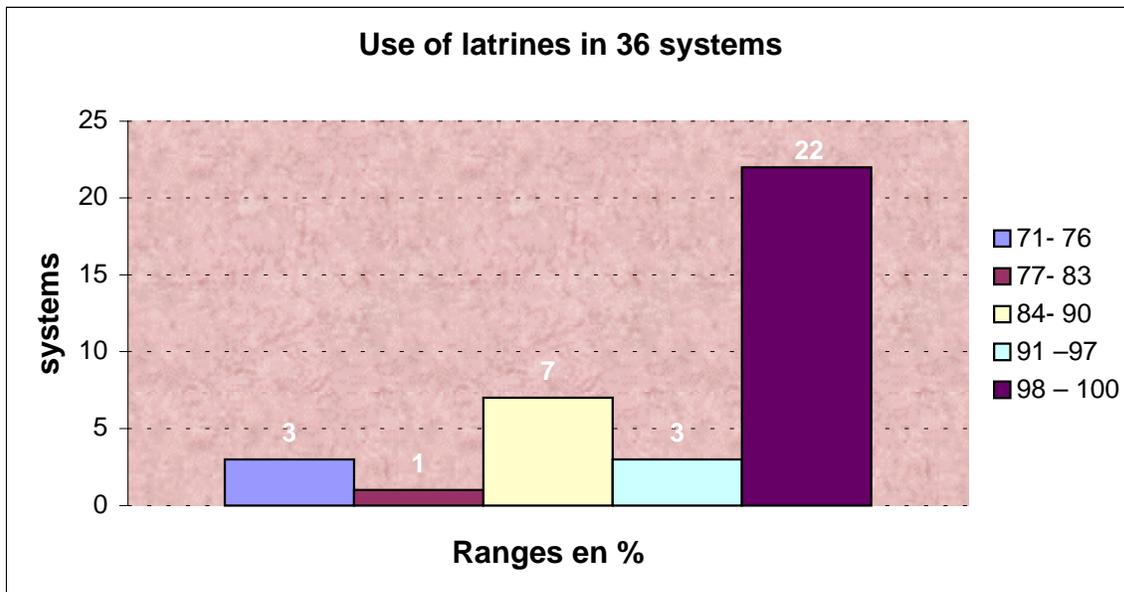
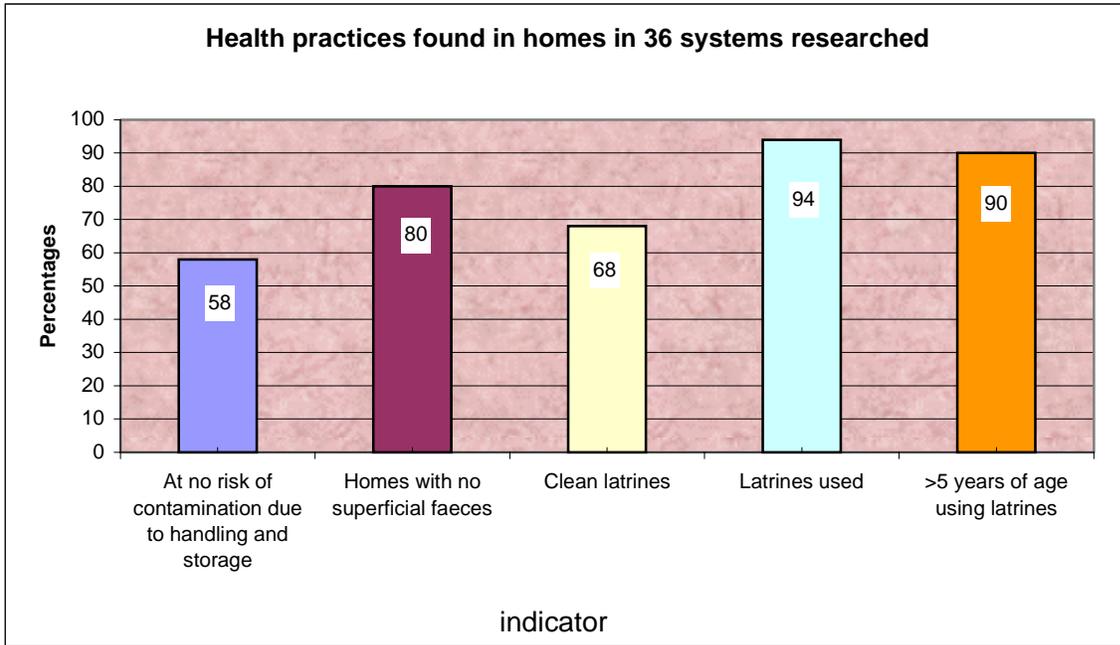
a. The impact indicators were analyzed for all the systems. Among the most important findings is that the rate of mortality due to diarrhea is 0.9/1000, in a sample of 2162 youngsters with less than five years of age in homes visited during the rainy season of 1998. This rate is way below the mortality rate established as goals for the Americas and by the National Health Commission.

It was also found that mortality has decreased 50% in 1998 in relation to 1994, year in which some of the water and sanitation systems researched began to operate.

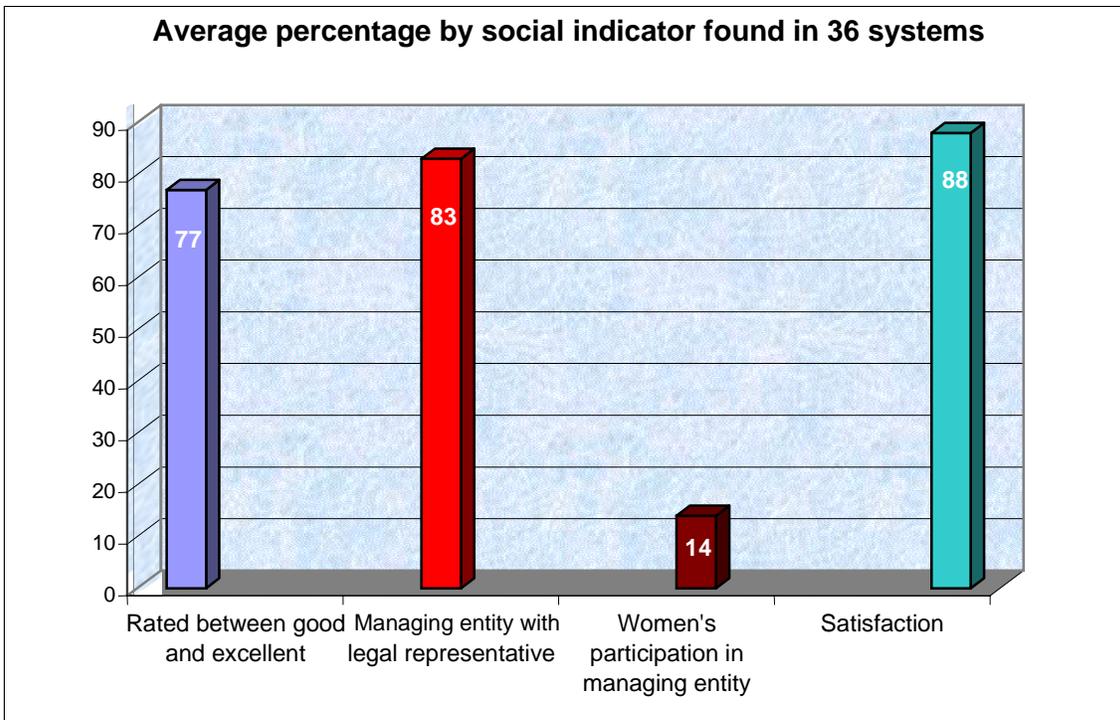
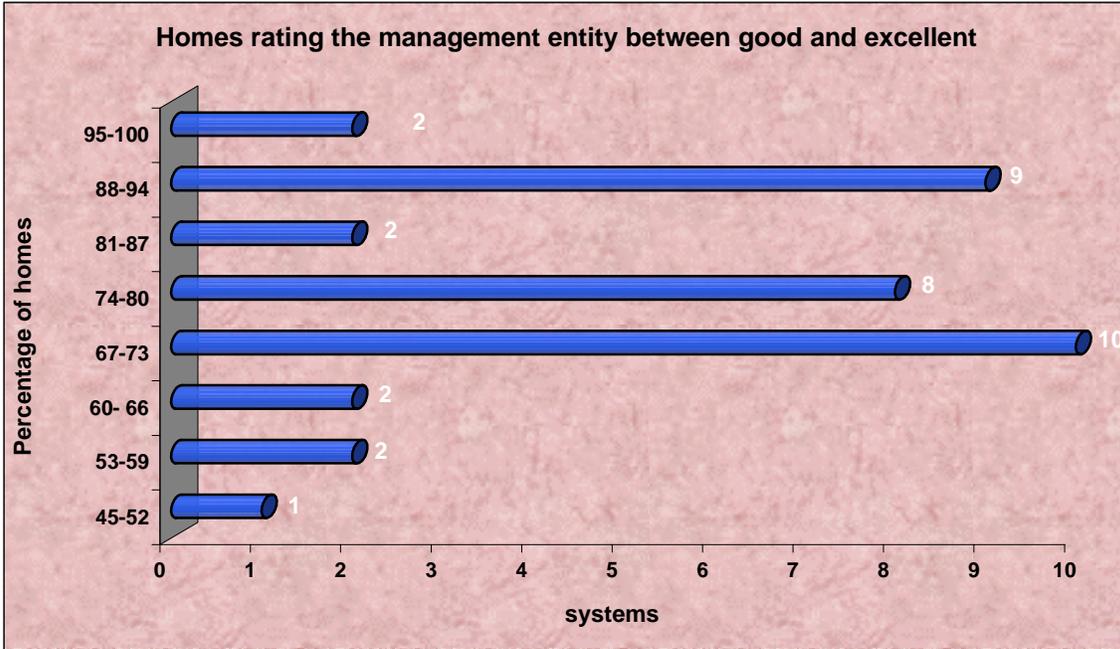
b.- The group of 36 systems that are providing a service and that are being managed by the beneficiary communities represent 65.5% of the researched universe. The following charts show a summary of the most important findings in this group of systems.

² National Administration of Water and Sewage

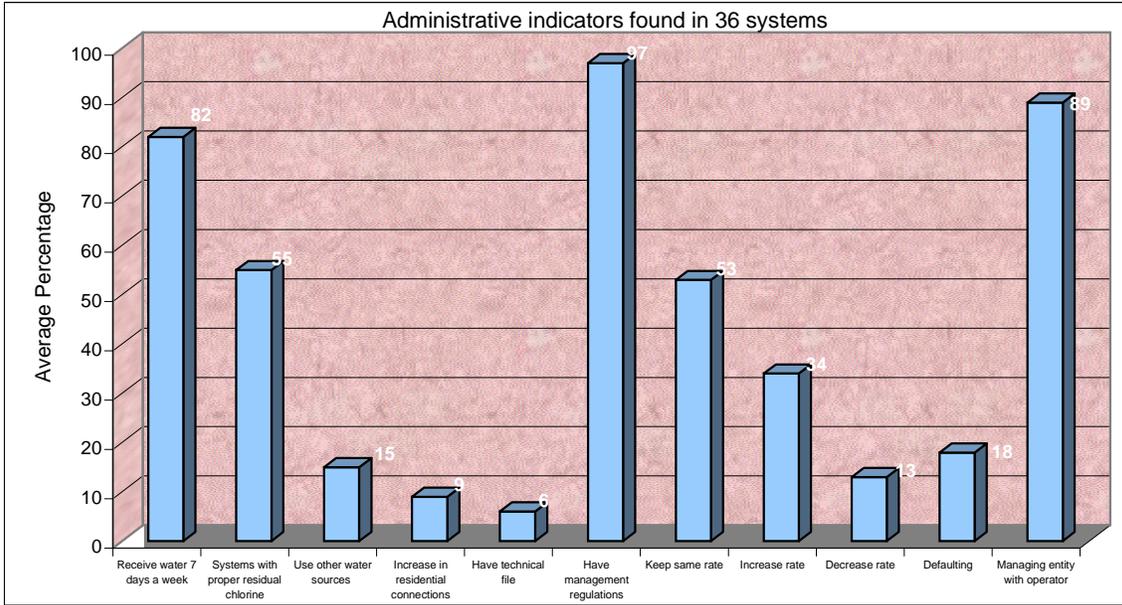
In the health component, it was found that beneficiaries in a great percentage have adopted better practices that contribute to improve the health of the population.



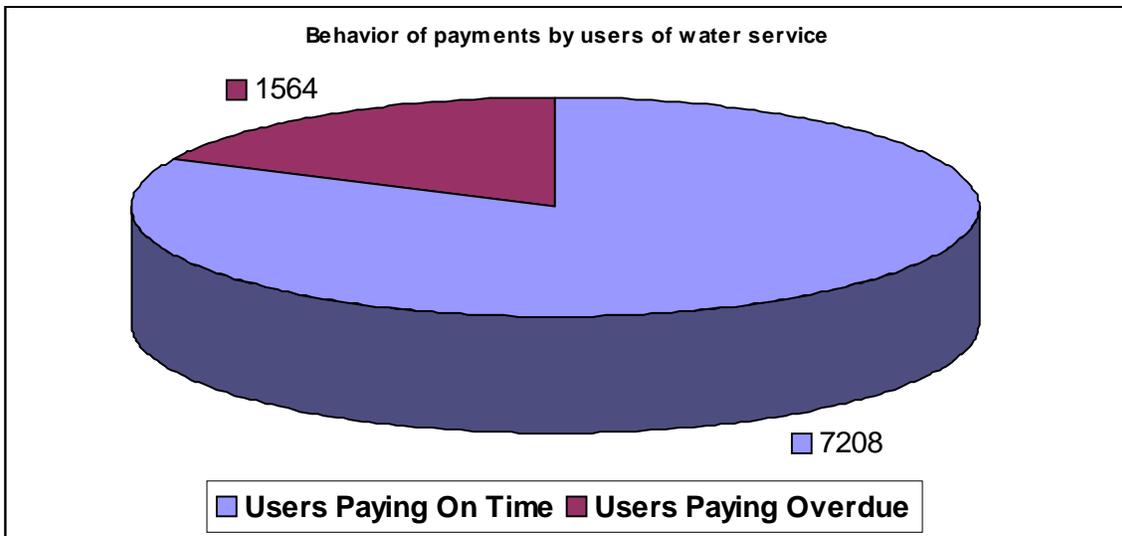
Some important aspects could be measured in the social component that relate to the sustainability of the rural water and sanitation systems.



Another researched component was the managerial and financial abilities of local management representatives responsible for the administration, operation and maintenance of water and sanitation systems.

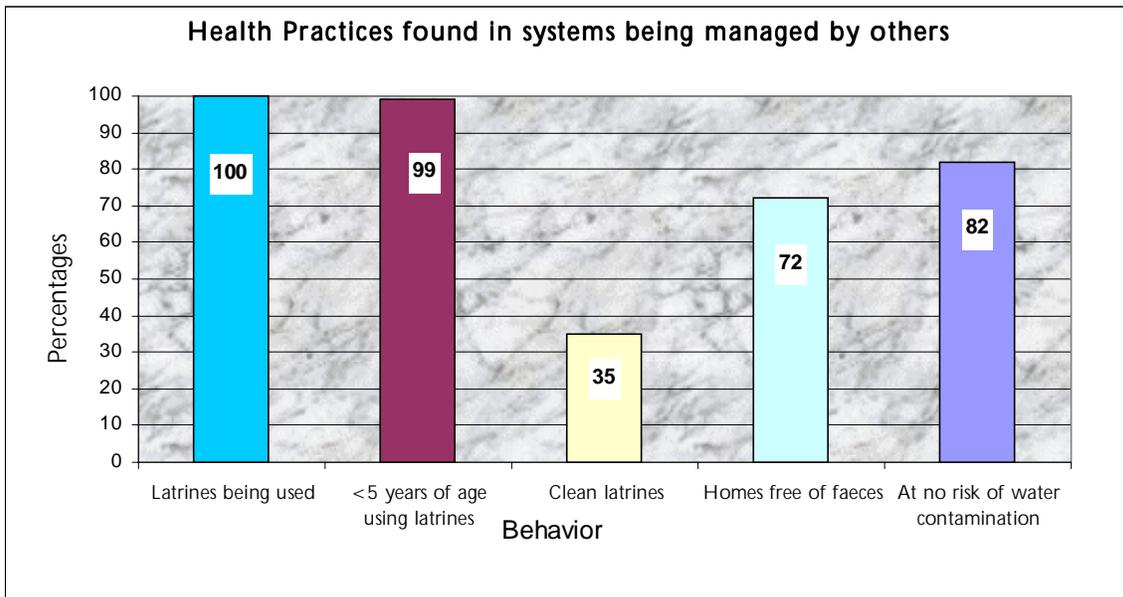


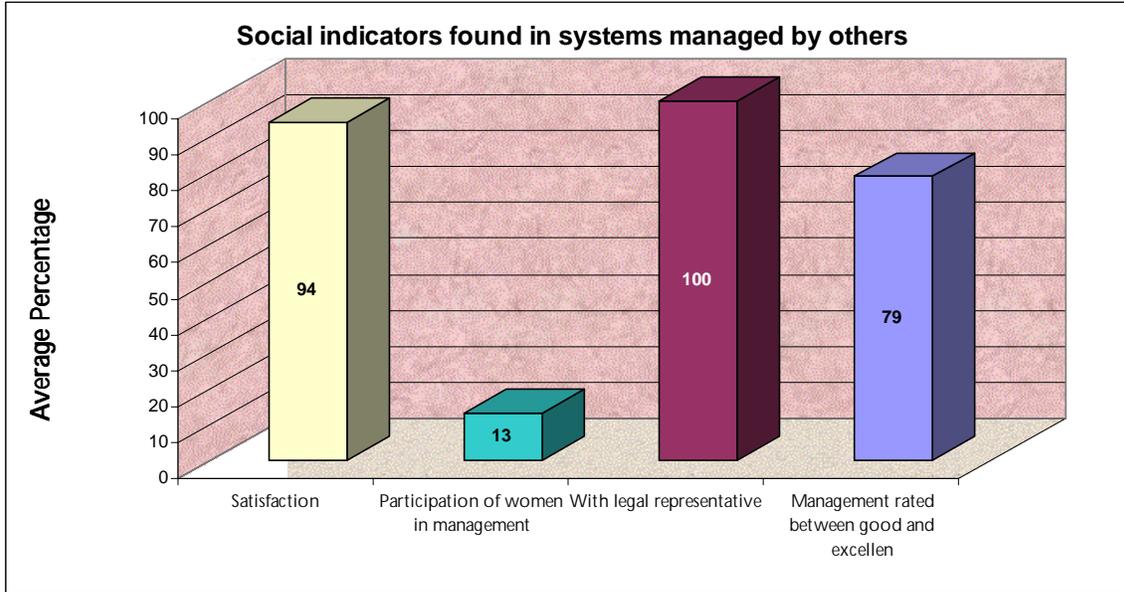
Regarding the culture of payment, it was found that 82% of the users pay on time the water service rate, and 18% pay overdue.



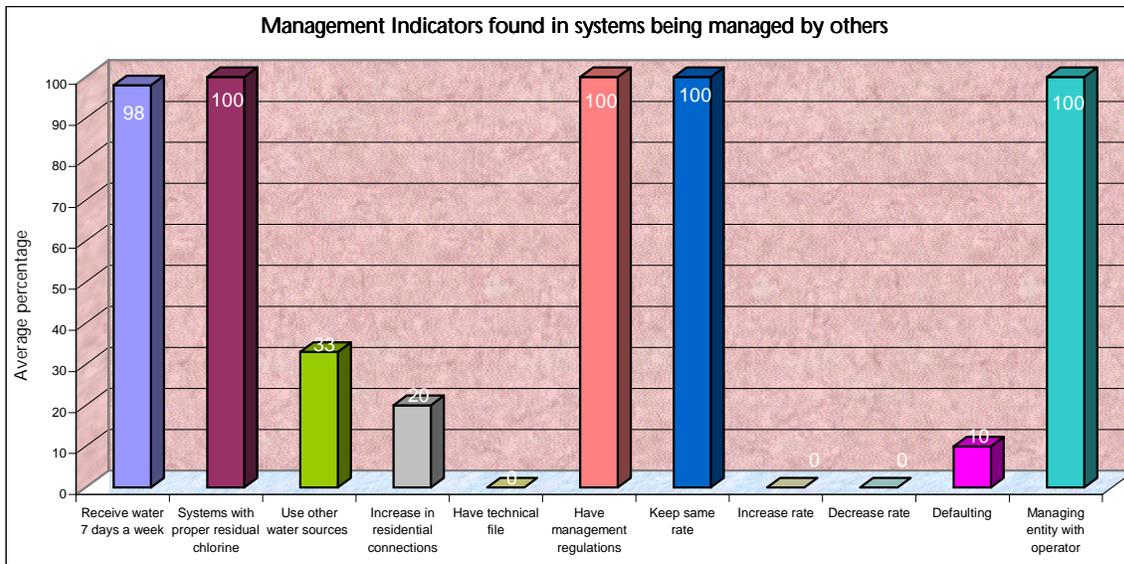
In the construction component, it was found that in this group 33% of the systems (12) have some leaks in the distribution network. Some of which are from defective construction (e.g., too shallow burying of PVC pipes in areas of heavy traffic of heavy vehicles). No leaks were found in 24 systems during the round conducted. Only 5% of the homes show leaks at taps. In 97% (35) of the systems, between 80% to 100% of latrines were found in good physical condition.

c. In the 6 systems that are providing service, but that are not being managed exclusively by beneficiary communities, the research was limited to some indicators, especially in the technical and administrative components. Such systems were built within urban areas, of which 2 are managed by ANDA, 1 by the municipality and 3 by the community in coordination with the municipality. CARE executed all these systems. The most important findings are shown summarized in the following charts.





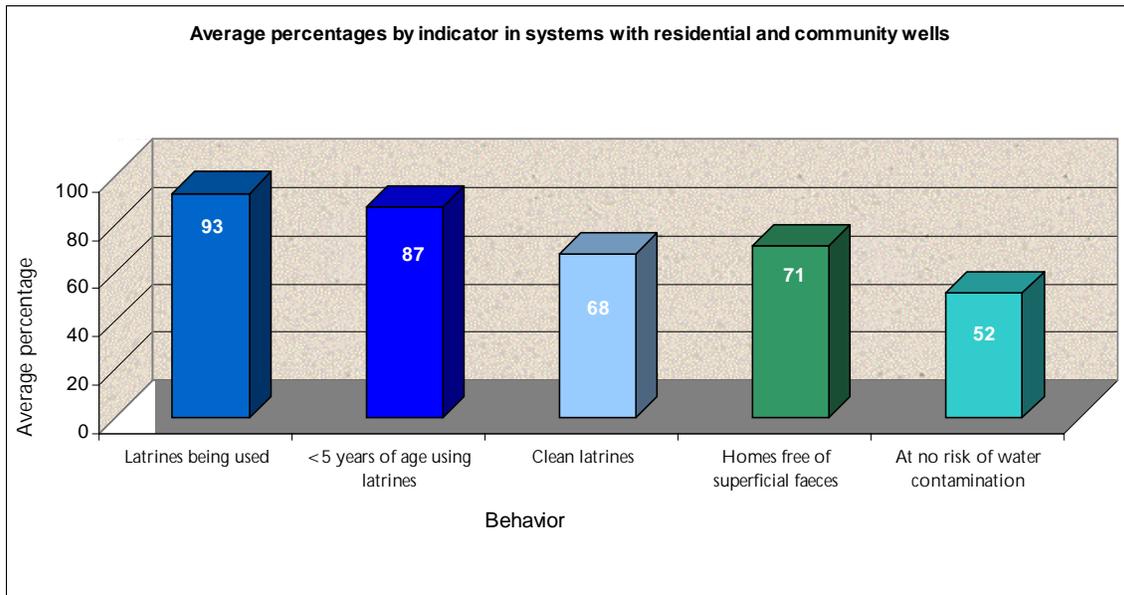
The managerial - administrative component could be researched only in four of the six systems of this group, and the findings are shown in the following chart.



In each one of the three systems with co-management models, of the two participants, either representative from the municipality or from the community assumes a leadership role and takes administrative decisions.

In the construction component, there were no leaks in the distribution network researched in this group. There were no home with leaks in taps in two of the systems; in another two systems minor leaks were found in less than 10% of the homes, and in the rest between 13 and 1, 25% of homes had leaks at taps.

d. - In the systems researched that have hand pumps for residential and community usage (3 and 6 respectively), one of those for community usage is out of service, hence the analysis of the group is referred to 8 systems. In this group, the indicators researched are focused in the health and construction components, this due to community organization for this type of system has not been required by the executing institutions. In the same way, these do not have a charging system for the service, reason why the administrative and financial components were not researched. The most important findings in this group are shown in the following chart.



The social component showed a better performance in those communities with residential wells, compared with the community ones.

The rope and Mayan pumps installed in residential wells were found to be working in 93% of the cases. Additionally, 98% of them have watertight protection by means of a concrete slab. On the other hand, the families visited expressed that among the community there are persons trained and with tools for repairing pumps. Families are in charge of buying the required spare parts and labor. A fairly low cost since the technology implemented is easy to repair.

The total of potable water systems that need technical assistance in the infrastructure component are fifteen (15), or 27%; the remaining 40 systems (73%), are operating without major difficulties or risks.

Regarding community wells, 75% are operating and 30% have a roof. Most of the wells out of operation have MARK II pumps; a technology more difficult to repair.

e.- In the 5 systems that are out of service, the research was limited to a situational diagnosis of each one of them around the water system, not including the sanitation and other indicators. This due to the beneficiaries' and local leaders' level of motivation that did not allow their involvement in the research process.

The critical issues identified in the management component of the systems researched are related to unnecessary expenses; lack of equity in the service; defaulting; and random changes in the rate for water consumption that does not cover the monthly operation and management expenses. The issues found in the social component are related to improper habits of hygiene; inadequate community decisions (such as approval of lowering of general rate). The problems in infrastructure were found to be inefficient operating abilities to solve some of them; lack of interest to solve problems related to water quality; systems with functional problems; among the most important ones.

Fourteen (14) of the systems, or 26%, require some type of technical assistance for the social component. This does not mean that the 74% remaining systems have 100% of quality in their social aspects, rather that according to the spirit of the diagnosis for identifying those systems with risk factors for sustainability, those are the systems that show them at a greater scale.

The basic indicators researched for the management component are summed up at the savings level that management has reached currently, and the type of service they are providing for users.

Based on the above, 71% (39 systems) of management has adequate savings to respond to expenses for the system's major maintenance.

The research included an accounting study. The results are satisfactory, in spite of the existence of some aspects that may be improved for each of the management researched.

Even though the communities are making a great effort in order to manage their systems, there are situations that exceed local abilities which prevent them from making the right decisions. Thus, an external institution is necessary to support the communities. In principle, this demands the definition of a national policy for potable water and rural sanitation, non-existent up to this moment.

The total of potable water systems that need technical assistance in the infrastructure component are fifteen (15), or 27%; the remaining 40 systems (73%), are operating without major difficulties or risks.

The results show that the communities have a high level of effort and compromise for the good management of their systems. In fact, several community leaders, including those that do not have critical problems, have requested aid to the facilitating institutions in order to improve the processes for decision making and management, specially those related to the ones faced by the administrative body; i.e., accounting issues, staff, administrative, etc. This is the same general conclusion of the report and, that is, in spite of the results, there is a need for managerial support. For example, most of the administrations do not keep orderly records, nor in correlative order, which prevents them from knowing their real financial situation which could contribute to improve the decision making process. Some of them lack guidance on the number of staff needed, which leads to hiring people that consume most of their income. Others allow irregularities that cause inequality in customer attention. However, up to this moment, those problems have not influenced their financial capacity; reason why it is necessary to lead them a better management performance. Something important in this regard is the need of a permanent institution to support the local managerial procedures.

Even though the communities are making a great effort in order to manage their systems, there are situations that exceed local abilities and that prevent them from making the right decisions. Thus, it is necessary an external institution to support the communities. In principle, this demands the definition of a national policy for potable water and rural sanitation, non existent up to this moment.

Another important aspect is that the participation of women in the managing body is not receiving the importance that the programs have stated. Even though they are included during the construction of works, after the facilitating institutions are gone, women are substituted or if they stay, in some places, they are assigned purely domestic duties. In the systems researched, only 17% had the level expected of women involvement, although this has not been an obstacle for managing the systems well. This makes it necessary to review the gender concept and its methodology in the potable water and sanitation systems.

It is also necessary to monitor the prevalence or incidence on illness and mortality due to diarrhea among children less than five years of age. Up to now, the programs have not performed any activities geared towards this aspect that could provide data in order to observe the impact of the water and sanitation interventions on the beneficiary communities. The data from this report may provide a baseline in this regard.

General conclusions

Among the general conclusions of greater importance it stands out the high level of local management in search of development implemented by the communities as a consequence of the water and sanitation projects; the communities show better personal and domestic hygiene practices; the level of community participation in other problems affecting them has improved; the responsibility assumed by the communities to operate, maintain and manage the water and sanitation systems is constantly found; the good use the communities are giving to the sanitary infrastructure shows that the hygienic practices at residential and community levels have become important to them; acknowledging their obligations and rights as users of the systems has produced internal exercises within the communities that try the ability to manage and solve conflicts by the managing body; in spite that rural communities lack assistance for those situations that escape their abilities, these have been able to manage each case and eventually have gone to the private sector in order to solve those situations within their economic reach (juridical counseling, technical engineering assistance, technical accounting assistance, etc.).

Regarding the environment, most of the communities are not working in order to preserve the water recharge areas for the wells they use. This is due to the lack of, or limited educational messages used during the implementation of the systems and consequently, the communities showed a very low concern on this regard.

It is important to point out that it is not the purpose of this research to conclude about the effectiveness or better strategies used by the three implementing institutions, since there were no suitable conditions for their work, neither the conditions of time, resources and geographical location were equal. Thus, it would be daring to make conclusions from the results obtained about the better or worse quality of the work performed by each one of them.

General recommendations

For assuring the sustainability of the rural water and sanitation systems, it is indispensable to include environmental protection activities in future interventions. Specially in the area of water recharge at the source of water supply, along with an educational component geared towards the beneficiary population, additionally to the health education and social components that have been implemented to date. For the systems already built, the possibility of including this component through other local agents shall be assessed, as a complement to the investment executed in order to protect the current supply sources.

In the strategies to be developed for the rural water and sanitation projects, mechanisms shall be sought for local agents to permanently follow up the health programs implemented by the project, and insure this component's sustainability. In water systems, it is required to improve the knowledge, design and adaptation of chlorinating systems more suitable for rural communities, as well as to educationally emphasize the importance of consuming potable water among the communities.

It is necessary to make future efforts in order to improve the coordination and support mechanisms among the communities and their respective local governments, as well as with the governmental agencies related with the sector to provide the communities with the necessary technical assistance on social, managerial and technical issues. It is necessary to provide technical administrative and accounting assistance to all managing bodies of the systems researched. At the same time, a technical and social research shall be performed among all the systems found out of service, in order to assess their current situation, to quantify the necessary resources to make them functional, and to accompany the communities in the search of a solution to the problem.

Before providing technical assistance to this group of researched systems it is necessary to prioritize the "Demand for technical assistance" in this report. Those indicators which aren't yet covered are in risk of jeopardizing the systems' sustainability. Also, the necessary resources must be assigned to execute the work plan aimed at the top priority systems.

Specific Conclusions and Recommendations

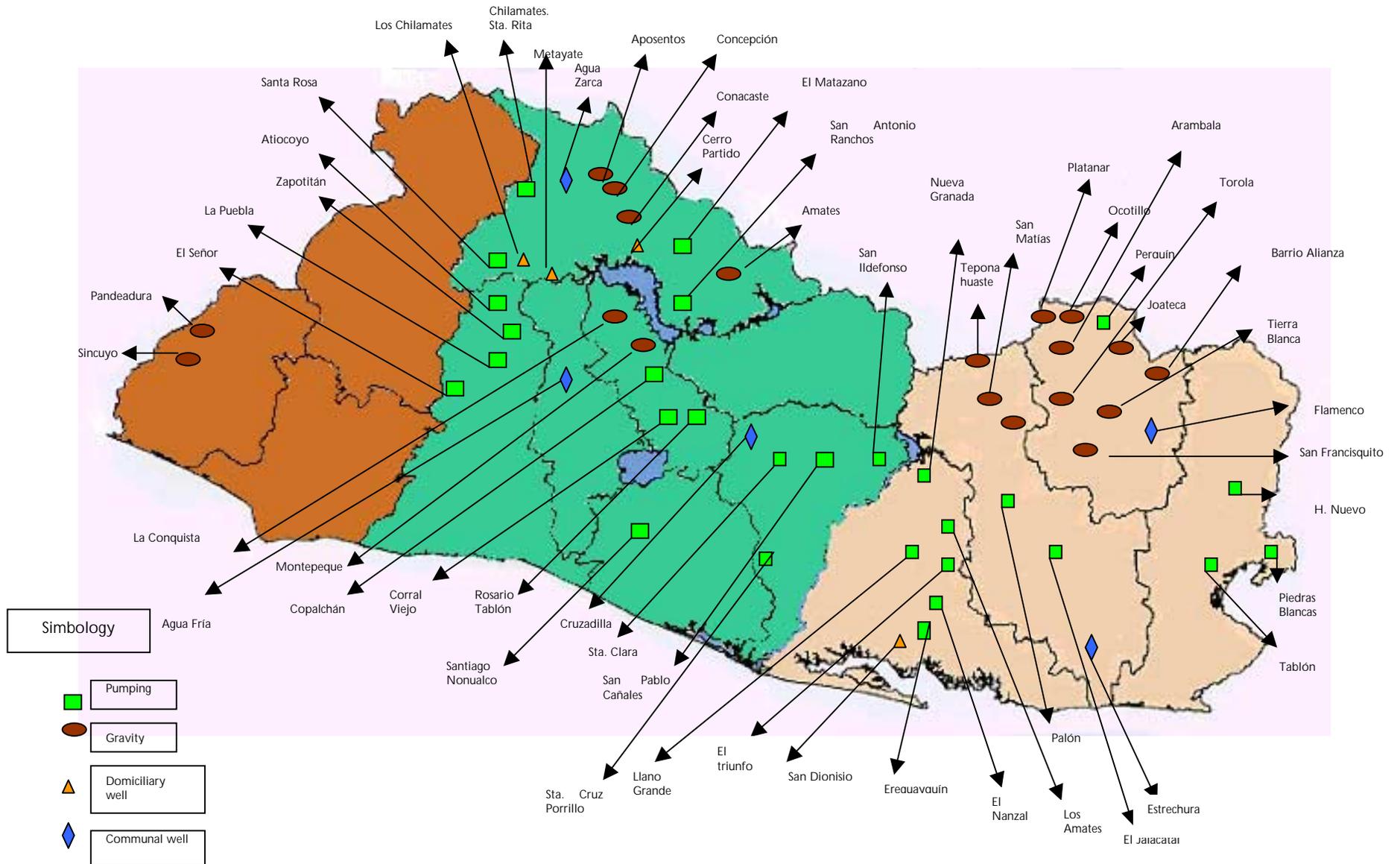
- ✓ The communities are showing a high level of commitment and willingness to manage their potable water and sanitation systems. It is necessary to support the efforts of the community with a national policy for the potable water and rural sanitation sector. Laws and regulations in order for the communities to have the external steady and permanent support to reach the sustainability they need. This could create a preferably local institution, to provide support for the communities and some type of follow up so community efforts are preserved.
- ✓ There are some weaknesses in regards to management by the bodies in charged; thus, it is necessary to train, based on their own local ability, to adequate the training methodologies related to accounting, administrative, financial, etc., aspects.
- ✓ Participation of women in managing bodies is very low, although during the construction of the systems it was acceptable. It would be necessary to have feedback regarding what type of involvement is expected from women in the management of potable water and sanitation systems, from the environment in which they live.
- ✓ The systems with critical problems in the administrative component are referred specifically to financial deficiencies. It is necessary to strengthen the knowledge of the managing bodies on the importance of financial health and its impact on their systems' sustainability. It would also be adequate to guide those with good results so as not to lose their perspective.
- ✓ Regarding the communities with severe deficiencies on their infrastructure, it is necessary to go back to the communities in order to solve the deficiencies and to leave the systems totally operational.

Some strengths were found that indicate that the road to local sustainability of water and rural sanitation systems is laid. Most of the weaknesses and restrictions identified are easily overcome if the communities receive technical assistance specifically for it; with the exception of the systems that were found out of service that require of major analysis.

According to the findings, the basic sanitation and social component show positive results.

In the case of the water systems, given the variety of technologies implemented, the magnitude of the same and the scarce experience in the rural sector to manage this type of technologies, they require more attention, compared with the other aspects mentioned before. However, the experience is rated as successful and it can be stated that with these interventions financed by USAID, El Salvador has become an example of decentralization of water systems and spaces have been created to foster sustainable interventions in the water and rural sanitation systems.

Geographical location report of the 55 water and sanitation systems developed by CARE CREA and PCI with USAID financing between 1993 and 1998



INTRODUCTION

2

This report is a preliminary activity to provide technical assistance to beneficiary communities of 55 potable water and sanitation systems financed by USAID, between 1993 and 1998, through the programs No. 519-0320 and 519-0394. Those systems were executed by the communities with technical assistance provided by three institutions: Project Concern International (PCI); Creative Associates International Inc. (known locally as CREA International); and Cooperative for American Relief Everywhere (CARE International in El Salvador). The three of them performed their activities in coordination with the Ministry of Public Health and Social Assistance (MSPAS) and, in some instances, with the respective Municipality. The main purpose of this assistance was to improve the health levels of the members of the beneficiary communities through the provision of potable water and sanitation systems.

USAID's investment amounted to US\$19.3 million, of which 7.9 million were invested through CARE between the years of 1993 and 1998; \$6.7 million through CREA International between the years of 1993 and 1996; and \$4.7 million through PCI between 1993 and 1997. This investment in potable water and/or sanitary infrastructure benefited approximately 130,384 people in rural areas and small urban populations of El Salvador. Such infrastructure was left to be managed by the beneficiary communities through trained local community organizations.

Of the 55 systems researched (Annex No. 4), 28 are using electro-mechanical pumping, 18 by gravity, 3 have residential hand pumps and 6 have communal hand pumps. Of this same universe of systems researched, 10 were built by CREA, 22 by PCI and 23 by CARE. Of these systems, 5 had been rehabilitated and 40 were brand new systems. Annex No. 5 shows the consolidated findings by institution.

The approximate number of homes that are using the researched water systems is 10,316 (approximately 56,738 people). Of those homes, some 9,340 of them receive water through pipes; 766 through artisan wells with residential hand pumps; and 210 through artisan wells with community hand pumps.

The main purpose of the investment in the communities was to improve the health levels of the members of the beneficiary communities through the provision of potable water and sanitation systems.

This diagnosis was performed according to the Cooperative Agreement³ No. 519-A-98-00-00041-00 signed on April 1st. 1998, between CARE International and USAID, as part of Project 519-0320 (Improvement of Public Services) from USAID in El Salvador.

The specific goals of this diagnosis are as follows:

- Identify weaknesses within the social, operative and managerial areas, that jeopardize the sustainability of USAID funds due to performance of previous programs.
- Identify strengths and weaknesses in the methodologies used by previous programs and to learn from them for future interventions.
- Design a plan of action to provide technical assistance to the communities showing weaknesses or problems that somehow jeopardize the water service and sanitation provided by the referred USAID's programs.

The diagnosis was aimed at exploring three components considered as basic for the rural water and sanitation systems' sustainability: the social, managerial and technical areas. In each one of these areas, the researched indicators allowed to see the direction of the technical assistance necessary to be provided during the life of the current water and sanitation program that CARE implemented with USAID's funds.

There is a variety of appropriate technologies used among the fifty-five systems: by gravity, by electro-mechanical pumps from deep wells; by electro-mechanical pumping from natural springs; residential and community hand pump systems. The diversity of technologies for sanitation infrastructure is limited to vented pit (known as VIP), fertilizing, and hydraulic seal latrines.

The results presented in this report were explored through the study of three fundamental components considered as basic for the sustainability of the works: a social component, an administrative or managerial component and a technical component.

³ This agreement refers to the "Program for Health through Potable Water and Sanitation" (PROSAGUAS), whose main goal is to reduce the occurrence of diarrheic diseases among children under 5 years of age through the provision of water and sanitation systems. The Program contains four main activities driven by twelve objectives. The "Provision of technical assistance to 55 communities in USAID's projects number 320 and 394" is one of those activities, governed by objectives number 8 and 10. This document corresponds to objective number 8, which seeks to "Provide technical assistance to communities benefited with water and sanitation systems through USAID's projects previously executed". This objective was included by USAID due to its interest in assuring that the investment made has met its objectives

The execution of the systems was marked by a facilitating activity that led to the creation of an ability to support the systems. These efforts for the long-term sustainability were present in all procedures and specific activities performed by the institutions. The projects' promotions were done in a way that the beneficiaries had to participate in all phases; this was to produce a "feeling of belonging towards the works" through the building effort involved. After the works were finished, the institutions fostered a learning process regarding the management of benefits by using a minimal process of decision making.

The institutions promoted the possible solutions for the provision of the systems, based on the conditions of each community or group part of a specific project. The communities were informed about the issues they had to decide upon in order to provide the works and to manage them in the near future. For instance, the necessary fee for the water systems' financial sustainability through their useful life was placed to the communities' consideration. According to figures, that fee shall cover monthly operating and maintenance costs, as well as produce a provision for major expenses (major maintenance). It is worth mentioning that some of the determined fees, such as those of the systems built by CARE, were figured out to generate enough savings not only for these type of expenses, but to restore the system at the end of its useful life (after 20 years). If communities agreed to care for the systems and to pay the corresponding rates, then the projects were carried out and the training for maintenance and operations took place. In most of the cases, the projects were developed around the following general activities:

- Promotion and training on the use and maintenance of latrines and other hygienic activities;
- Promotion of female participation in the process;
- Promotion of non-qualified labor and donations as counterparts;
- Training of health committees in order to follow up on the type of sanitation promoted;
- Building, in some instances, relationships between communities and local authorities (municipalities);
- Training the managing organization that would manage the potable water system, etc.

Following is a summary of the activities performed by each executing institution of the projects.

PROJECT CONCERN INTERNATIONAL (PCI)

Project Concern International is a non-profit international organization whose work in the rural water and sanitation sector in El Salvador has been developed in the central area of the country, specifically in the departments of San Vicente, Cabañas, La Paz, Cuscatlán, Chalatenango and San Salvador.

Between 1993 and 1997, PCI has executed about 87 water and sanitation projects with USAID funds, 46 of which were just sanitary infrastructure. The total population with water and /or latrines is 46,456; of which 21,873 only received latrine infrastructure; 3,275 only received water from wells with hand pumps; and 21,306 received latrines and piped water. Of those 87 systems built, 22 have been analyzed in the present research.

PCI used a participative methodology through community facilitators, who were responsible for several educational components. They helped the managing boards to organize their participation, build a strong and permanent local structure for managing the water and sanitation systems and to participate autonomously in future projects. Its educational methodology in the health component was supported by educational material published by UNICEF and by its strategy.

CREATIVE ASSOCIATES INTERNATIONAL, INC. (CREA)

Creative Associates International, Inc. is a private enterprise linked to USAID donations, whose work in the rural water and sanitation sector in El Salvador was performed on the country's three regions, with major emphasis on the western region. Its work was developed in communities from the departments of La Unión, Cabañas, Chalatenango, La Libertad and Ahuachapán. Future financing has been designed for the departments of Sonsonate, Santa Ana, Ahuachapán and Chalatenango.

Between 1993 and 1996, CREA executed 14 water and sanitation systems with USAID funds, benefiting 87 communities, with a total population of 31,133 with water and /or sanitation, of which 5,800 only received latrines; 3,020 only received water; and 22,305 received water and latrines. From the total of systems built, 10 have been researched.

CREA used a participative methodology through its community facilitators, who were responsible for the different educational component. They helped the managing boards to organize their participation, build a strong and permanent local structure for managing the water and sanitation systems and to participate autonomously in future projects. The work strategy for the educational and organizational component was less systematic and formal; it was oriented according to the nature of each community.

Cooperative American Relief Everywhere (CARE International In El Salvador Or CARE).

CARE International is an international NGO whose work in the water and sanitation sector was developed in rural communities and some urban areas in municipalities from the eastern region of El Salvador, including its four departments: Morazán, La Unión, Usulután and San Miguel.

Between 1993 and 1998, CARE executed 51 water and /or sanitation projects with USAID funds, benefiting a population of 52,792, of which 2,186 were only benefited with latrines; 9,452 only received water through hand pumps; 4,588 only received water through an electro-mechanical system; and 36,566 received both benefits. From the total systems built, 23 have been researched.

CARE's social promoters used a participative methodology to help the managing boards organize their participation, to help build a strong and permanent local structure for managing the water and sanitation systems as well as their ability to participate autonomously in future projects. Health volunteers trained by CARE provided the educational messages. The educational program implemented was more systematic and formal; this was partially supported by UNICEF's educational material, which was complemented with material and content developed by CARE.

Research Team Composition

A series of indicators were used to measure the present situation of the water and sanitation systems implemented by the three institutions. These indicators measure issues from the research areas, according to PROSAGUAS' objectives. The research team used several techniques to gather the information required. The team responsible for the field research was composed of technicians from different disciplines, each member with expertise on rural water and sanitation issues.

The planning of the research process included the conceptual and operative definition of the indicators; the choosing of necessary techniques and tools to gather information, as well as their review by CARE El Salvador's technical and management staff from the Water and Sanitation sector, and their validation and adjustment before its definite application.

Application of the Research Techniques and Tools

Research techniques used according to the issues or area of investigation were: a) focal groups used to determine the user's perception of the service received; b) residential surveys, interviews, questionnaires and review of records were used to gather quantitative information; and c) interviews and observation guides were used to gather qualitative information. (See Table No. 1).

The survey was applied to 12.5% of beneficiary homes; focal groups were applied to female users of the water system. The inclusive criteria used to perform the survey were three: homes with residential connection, with latrines and with children under five years of age. For the focal group, besides being users, women had to live in different sectors of the community and be older than 18 years of age.

TABLE NO. 1
Techniques And Sources Of Information Used

Informants	Technique	People surveyed	Tool
Managing organizations	Interview	44 groups with an average of 8 people	Structured survey guide
Head of home	Survey	1.286	Survey guide
Plumbers, operators	Interview	44	Interview guide
Housewives	Focal group	44 groups between 6 and 12 people	Focal group guides
Health services (promoter)	Questionnaire (self administered)	36	Questionnaire guide
CARE specialized engineer	Inspection of all system's components	Plumbers and operators	Observation guide
Accountant/treasurer	Interview, review of records	41	Structured interview guide

The research about the administrative and financial situation was performed through an interview with the president or leader of the managing organization and the person responsible for keeping accounting records. A review of accounting records for three different periods of the administration was performed: the first three months, three intermediate months and the last three months at the date of the research. For the cases where the municipalities manage the systems, the information was gathered from the municipality's internal records.

The study of the occurrence of diarrhea in children under five years of age in the communities where the projects were executed, was performed through primary sources (home surveys and interviews to key community leaders and informants). Secondary sources such as MSPAS records from health promoters and health services, were also used.

Community leaders participated in the process of applying all tools, especially those which helped plan the activities presently responsible for the system's management.

Information Processing

The search's final product is divided in two sections: a final report that includes a general analysis and the results by indicator researched, plus 55 individual reports -one per researched system.

All the information was processed with the support of the following tools:

- A database was created using epidemiological research software called Epi Info (5.0) for survey processing.
- Data from interviews to management organizations, infrastructure diagnosis, accounting research, surveys and health services was consolidated in a database in Excel, Ms Office 97. This information was the basis for obtaining the indicators to be included as results in the final report.
- Focal groups' reports (qualitative information) are found in the systems' individual reports.

Sample selection

The approximate number of homes in the researched systems was 10,316. A sample of 1,286 was taken for the survey. According to Taro Yamane's statistical table, Elementary Sampling Theory (used by Jarol B. Manheim, Empirical Political Analysis, pg. 449. Alianza publishing, Spanish version), it may be stated that the present research has a 95% reliability level, and +/- 3% of accuracy.

RURAL POTABLE WATER AND SANITATION SECTOR IN EL SALVADOR

4

El Salvador is located in the torrid zone of Central America. It borders with Guatemala to the west, with Honduras northeast, with Nicaragua southeast (the Gulf of Fonseca is in between) and the Pacific Ocean to the south (321 Km of coastline). It is the only country in Central America with no coastline on the Atlantic Ocean.

The country has an approximate land surface of 20,700 km². It is geographically divided in three regions: Eastern, Central and Western. It has 14 departments as political division, along with 262 municipalities. The three regions have very different water resources. It is topographically divided in three regions: i) the northern mountain region; ii) the central low region, and iii) the coastal region. Their heights altitudes vary from 0 to 2,700 m.a.s.l.

The predominant land formations are divided in low lands (coastal prairies along the coast); central plateau (mainly hills, volcanic chains, valleys and flat plateaus); and northern mountains (rugged mountains, mountain chains, narrow valleys and gorges). There are seven volcanoes, several volcanic lakes and lagoons parallel to the Pacific Ocean. This makes El Salvador a highly seismic country, with subterranean and superficial water often with potabilization problems due to the presence of chemicals such as arsenic, fluor, iron, manganese, and others.

El Salvador is Central America's most densely populated country (275 hab/ km²); its population is approximately 5.7 million inhabitants, of which 43.3% live in rural areas and 56.7% in urban areas. The population growth rate between 1990 and 1995 was 2.1%.

El Salvador is Central America's most densely populated country (275 hab/ km²); its population is of approximately 5.7 million inhabitants, of which 43.3% live in rural areas and 56.7% in urban areas.

According to estimates⁴, approximately 75% of the territory is affected seasonally by great problems of erosion and loss of soil; 98% of the original forests have been destroyed; 90% of superficial waters are contaminated with sewer, agri-chemicals, industrial waste and sediments.

El Salvador has an annual average rainfall of 1,800 mm, which regularly occurs between the months of May and October each year. This rain disappears rapidly due to the low filtration capacity of the high areas in the hydrographic basins, which results in a scarce recharge of water-bearing stratum and frequent floods in the low areas of the basins.

The amount of water resources in El Salvador is enough to supply the whole population; however, its location and quality are such that it is often hard to use for human consumption.

Other researches report that 56.5% of the total population has access to potable water; 4 out of 5 families (78.3%) living in urban areas have such service, while only 1 out of 4 families (25.5%) living in rural areas receive the same service. The national sanitation coverage is 85.2%; in the urban areas 97.5% have sanitary means for sewage disposal; 68% have this service in the rural areas⁵. However, the rural coverage does not show the same percentage making proper use of the existent infrastructure.

In El Salvador, about twenty institutions are related to water resources, with often contradictory legal mandates and jurisdictions.

The institutions identified in the National Policy and the ones receiving support from the Central Government are the Coordinating Commission for the Reform of the Water Sector, the Ministry of Public Health and Social Assistance (MSPAS), the National Administration for Water and Sewage (ANDA), the Social Investment Fund for Local Development (FISDL), and the Salvadoran Institute for Municipal Development (ISDEM). Among these institutions there are also municipalities which have authority to manage the water resource; however, the centralized management of this resource by state institutions and the limited ability to manage properly found in most municipalities have not allowed them to respond effectively to the civil demand for water resources.

Unconfirmed data reports that 56.5% of the total population has access to potable water; 4 out of 5 families (78.3%) living in urban areas have such service, while only 1 out of 4 families (25.5%) living in rural areas receive the same service.

⁴ DIGESTYC, "Proyección de la población de El Salvador 2025", Ministerio de Economía, 1995.

⁵ Medición de Metas de Media Década, UNICEF, 1996

The institutions involved in rural area projects as ANDA through Management of Rural Systems (GSR); CARE with funds of the United States Agency for International Development (USAID) and other donors; the United Nations Children's Funds (UNICEF) through the GSR and MSPAS; the Japan's International Cooperation Agency (JICA) through GSR; FISDL through municipalities and construction businesses; the European Economic Community (CEE) through the program ALA 93/30; the Swiss Cooperation for Development (COSUDE) through PROVIDA; and Project Concern International (PCI) with funds from several donors.

Among the main foreign cooperation agencies that currently support in several ways the rural water and sanitation sector are: USAID; the Inter-American Development Bank (IDB); Swiss Cooperation for Development (COSUDE); the German Agency for Technical Cooperation (GTZ); the Japanese Agency for International Cooperation (JICA); the European Economic Community (CEE); the United Nations Children's Fund (UNICEF); the German Bank for Reconstruction (KfW); and the Pan-American Health Organization (OPS/OMS).

The absence of a regulating entity for planning and auditing the rural water and sanitation sector represents a main issue, although there are various agents intervening in that sector as the ones mentioned above. Indeed, the dispersion of laws relating to the water resource; the lack of sector coordination and regulation; the scarce state investment in the rural sector; the absence of institutional agreements to provide the proper technical assistance to local organizations managing water systems; and the decay of many rural water systems, are, among other of the existing problems. This is evidence of the reality faced by the rural water and sanitation sector.

The supply of potable water and sanitation has always been a responsibility of the State, which in 1961 created the National Administration of Water and Sewage (ANDA), providing it with normative, production and auditing functions. This institution has, up to this date, focused its main efforts in the great population centers, including 181 municipal urban areas. During the 70s, the National Plan for Rural Basic Sanitation (PLANSABAR) was created as an agency of the Ministry of Public Health and Social Assistance. This office was closed in 1995 as a result of the State's modernization process, giving ANDA the responsibility for the rural sector once again.

The absence of a regulating entity for planning and auditing the rural water and sanitation sector represents a main issue, although there are various agents intervening in that sector as the ones mentioned above.

Facing this reality, the role that the NGOs and the international cooperation agencies have played in this sector in the last years has been crucial for coverage increasing. However, those efforts have not been totally coordinated among cooperating agencies and very little among the different executing organizations of local projects and programs.

The current legislation for the water sector is disperse and contradictory. Thus, the Coordinating Commission for the Reform of the Water Sector was created in June of 1995. This institution has been driving law initiatives to make order in that sector, including the potable water and sanitation sub-sector, through the Coordinating Unit for the Modernization of the Water Sector. This set of laws is awaiting its review and approval by the Legislative Assembly, and this part of the process demands a great dose of political will and commitment.

Another initiative for El Salvador's water and sanitation sector improvement has been driven by the Regional Network of Water and Sanitation for Central America (RRASCA), which has promoted the Salvadoran Network of Water and Sanitation. Through this structure the main foreign cooperating agencies, governmental institutions, NGOs and programs are presently joining coordinated efforts to bring some order to the water and sanitation sector, specifically in the rural area and fringe urban. One of the first drives has been the integration of an information system and the exchange of experiences between the institutions that make up such network.

The management of water and sanitation systems in the main urban centers is under the responsibility of ANDA, which includes 181 urban municipal areas and 35 rural communities; municipalities manage 72 urban-municipal systems. The rural systems executed by NGOs, programs, FISDL, National Reconstruction Secretariat, ANDA's Management of Rural Systems, and, others, are mainly operated and managed by community organizations whose activity demands some type of external assistance.

The following up of the current rural water and sanitation systems is one activity that has received very little attention by the main actors within the sector, although its importance is acknowledged. This is a current weakness that the rural water and sanitation sector presents.

There is no organization directly responsible with installed capacity to provide the technical assistance demanded by the rural communities and municipalities that are operating and managing the water and sanitation systems.

There is no organization directly responsible or with installed capacity to provide the technical assistance demanded by the rural communities and municipalities that are operating and managing the water and sanitation systems.

Despite the experience of local disperse interventions, the new guidelines and trends within the rural water and sanitation sector in El Salvador resemble the reknown successful policies and, thus, an era of sustainable planning can be anticipated.

CONDITIONS THAT GUARANTEE THE SUSTAINABILITY OF THE WATER AND SANITATION SYSTEMS

The purpose of this section is to guide the reader on the interpretation of the results of the diagnosis. This diagnosis is divided in two parts: A) The first one is related to the conceptual basis that the research team considered determining for the sustainability of the rural potable water and sanitation systems. These bases refer to the conditions in the following components: social, administrative or managerial, financial, technical-construction, health, and health education, which make the sustainability of the systems feasible. Another very important component for the sustainability is the environmental one, however, it is not a part of this research due to the fact that the projects were executed without any specific consideration to that component. Nonetheless, comments about this concern can be found in the section conclusions and lessons learned. B) The second part includes an explanation of the conceptual and operative criteria used for the researched indicators, which support the analysis of the five components presented in the first part.

A) Sustainability of the Rural Water and Sanitation Systems

The spirit of the provision of this type of service in the rural area is to provide an opportunity for the population to have access to potable water and to adequate sanitation. This means an improvement in their level of health -very deficient in this sector of the population, and thus their quality of life. As a final result, the benefits from this provision have positive impacts especially on children under five years of age because the incidence of diarrhea and mortality due to this cause are reduced. The older children end up benefiting because they do not suffer from diseases that keep them from attending school, being able to participate in productive activities in the future. However, it is not enough to provide the service. This service also has to be managed, operated and maintained in order to extend its useful life beyond the period of design (20 years).

The management, operation and maintenance of the systems has been delegated to the beneficiary communities (with the exception of 3 from the 55 analyzed). These communities have been also trained to manage their systems with sustainability criteria. However, since local management is a new process in the country, there is a lot to learn about the factors that make the provision of water and sanitation systems successful in the rural area and furthermore, its sustainability after the institutions supporting the communities in the execution of the works leave.

For this report, "the sustainability of the rural water and sanitation systems makes itself present after the managing communities are capable of performing its functions with minimum external technical assistance". From there, the success of the investment made shows itself through the long-term sustainability.

The road to sustainability -as in other areas- is paved with the right decision making and management regarding the direction of the systems. Here forth, "... Whatever the content of the specific activity of the technical assistance, the right role of the supplier is to perform the requested assistance in a fashion that creates ability. This approach helps insure that abilities are transferred, not only information" (WASH, 1993). The communities need not only to receive material benefits, but intangible ones that help them create abilities for that decision making and management that they need to perform". According to data gathered, the beneficiary communities with the 55 researched systems were subject of assistance geared towards this goal.

The five components that guided the research are influenced by the decision making and management performed within the communities. They come to life from three active approaches:

THE COMMUNITY APPROACH (civil participation). Is determined by the agreements defined by decisions taken by the entire community; its expression is found within the assemblies held for that purpose. For example, the type of monthly fee that adjusts to each family to charge for the water service, and the system's operational, maintenance and management costs were agreed in these assemblies. The search for funds for new projects may also be decided in these assemblies, or may serve to inform about the activities of the directing boards or other bodies created by the community. It means that important and global aspects that govern the development of the community as a whole may be decided in this perspective of action.

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THE MANAGERIAL APPROACH. It includes the performance of all those activities geared towards maintaining the systems operational. This is accomplished through the implementation of processes and regulations that involve users, especially for the potable water systems, which is a responsibility of the managing organizations trained for that end. These organizations have to make decisions and perform actions that foster a good service for the customers (users).

THE DOMESTIC OR USER'S APPROACH. Individual or family activities that can affect the caring and maintenance of the systems are performed here. The users' attitudes and behaviors determine these activities. For example: the use of water for other than for human consumption, that may restrict the service to other people; the decision of not paying their bills on time; disregard for domestic hygiene that may affect the neighbors; etc.

In summary, all actions conducing to the system's sustainability - from any of the approaches- are summed up in the set of different decisions made and actions performed that arise from the active community participation found. Thus, as it is presented in other part of this document, there is a variety of indicators that imply specific behaviors, especially in the social, administrative and financial, technical, and health education aspects.

Community participation expressed through different types of decisions and actions provide inputs that determine the current state of the systems in its sustainability's most general components. Following are the indicators that make up such components: understanding that each of them and their respective researched indicators are independent, whose conceptual frontiers are almost impossible to define. Annex No. 6 presents in a summarized fashion the approach that the research team has followed, the type of indicator researched, its grouping, the researched factor, and the unit of measure for them.

i Indicator for the Administrative or Managerial and Financial Component

These indicators include all the actions performed by the local organization that manages the systems. Included as main indicators for measuring the management and financial performance are: the existence of management regulations and their application; the fee charged for the water service; the incorporation of new household users; the existence of trained plumbers; the type of service offered to users; and the water treatment for its potabilization.

Its way of planning, execution, coordination and control of actions may be used to examine local management. Management (accounting, personnel, etc.) and operational aspects may also be taken into account. However, the team recognizes that community participation is still in its infancy, as part of a long process.

The managerial ability of the local managing organizations is also influenced by aspects considered in other components, such as the legal status of the organization, the system's operation, and users' satisfaction, among others.

The managerial and financial sustainability may be restricted by internal and external factors to the beneficiary communities. a) External factors: increase in the cost of electricity for electro-mechanical pumping systems, and the lack of a permanent institution to provide technical assistance when the situation is beyond the community's capacity. b) Internal factors: the level of defaulting, non-adjusted fees, non-eligible expenses, low trustworthiness of the leaders, their rotation every other period (two years average), especially by the low level of savings, and the effective and prompt service.

Two aspects to highlight in this conceptual approach are the savings and the effective and prompt service. They exercise a great influence on the systems' local sustainability.

The key for the communities to have acceptable levels of savings is the established fee for water service. CARE, PCI and CREA foresaw the possibility of savings by estimating fees that include depreciation of equipment and, in some cases, as in the systems built by CARE, the fees also include provisions for the entire systems to be used at the end of their useful life. In order to obtain financial sustainability, the level of savings by the local managing organizations must represent a proportionate percentage of the total future cost for major maintenance. The level of defaulting, unadjusted fees, non-eligible expenses, represent restrictions to those provisions.

The effective and prompt service that the water managing organization provides is related to its ability to respond to the needs both the system in terms of repairing infrastructure, as well as user's satisfaction ("community service to customers"). The service may be influenced by the lack of attention to user's problems, by

Therefore, a potable water system presents financial sustainability if the savings produced account for the cost of the total major maintenance expense. On the contrary, it would not be sustainable.

Then, an effective and prompt service meets users' needs, through an effective program for the system's maintenance.

domestic waste or leaks on the distribution network, and/or by flows in the system's infrastructure (inadequate technology, poor construction, etc.), or users' defaulting. All these factors influence at the same time the user's perception of the performance of the water managing organization.

ii Indicators of the Social Component

The social factors analyzed in the diagnosis were associated to the level of local management reached by the managing organization. This level includes the legal situation of the managing organization, customer satisfaction, the perception about the managing organization's performance, and female participation in this organization.

The management's ability of the community shall be recognizable through general management indicators such as the decision to raise the fees when required; change of directors; search of funds to improve the system; construction of works to protect them, investments to complement them; decisions to stop payment of fees, raise them or keep them the same, etc.

Female participation must be recognizable in decisions that affect them, not just as wife or mother, but also as member of the community. Therefore, women must not be subject to the traditional participation expressed only through domestic work or reproductive function. In this sense, their participation may take place through the keeping of proper levels of hygiene at home; watching to reduce the waste of water, participating in important decisions that affect the system's sustainability, etc. However, the research was limited to finding the number of women that belong to the managing organization and to know the acceptance users have on female participation in the directive organization.

Female participation must be considered in decisions that affect them, not just as wife or mother, but also as members of the community. Therefore, women must not be subject to the traditional participation expressed only through domestic work or reproductive function.

iii Indicators of the Technical-Construction Component

Choosing the proper technology is one important aspect in the systems' sustainability. Technology has a social and technical function to be considered. Its installation is also important in the sense that its infrastructure should not be an obstacle to the community's managerial performance. Thus, the research has been performed in order to find out how the systems are operating; what quality level is present in the water; the existence of leaks on household connections, on the distribution network, impellence

and adduction lines; if the operational personnel has been trained; among other aspects. The physical condition of the sanitary infrastructure is included in this component, as well as the revision of some hydraulic and electro-mechanical designs in those places where it was feasible to do it.

iv Indicators of the Health Education Component

The sanitary conditions as a result of the health education provided have been analyzed from this component and from a community point of view. Other researches conclude that "in order to increase the health benefits through sanitation improvements, the most important goal and indicator is not the individual sanitation but the improvement of the community sanitation to the extent that at least 75 percent (in communities densely populated) of the population have access to the adequate sanitation services and use them correctly"⁶.

In that context, this research aimed its attention to finding out about some of the hygienic habits related to the sanitation component. For example: the percentage of latrines in use, percentage of children over five years of age that use latrines, percentage of households with no faeces around the compounds or latrines. And the percentage of households that handle and store water correctly for human consumption was added to this component.

Therefore, if the population of the community is highly concentrated the type of domestic sanitation practiced affects the neighbors at a greater extent.

v Indicators of the Health Component

Unlike the effect indicators described before, this indicator is the only one about impact that the team evaluated. This indicator was oriented directly towards the main goal of the current water and sanitation project that CARE El Salvador executes with USAID's funds (reduce the occurrence, predominance, and mortality among children under five years of age due to diarrhea. For that reason the indicators researched have been the predominance and mortality in this segment of the benefited population by the systems researched.

⁶ Hogrewe, Joyce and Perez. "The Unique Challenges of Improving Peri-Urban Sanitation". Technical Report No. 86 of Project WASH, supported by USAID, July of 1993, pp. 19-22.

B) Conceptual and Operational Definition of the Researched Sub-indicators

A distinction in two types of indicators has been made: impact indicators and of effect, in order to facilitate the analysis of the findings.

The impact indicators enclose the health components: mortality and prevailing of diarrhea. The effect indicators enclose aspects related with the health, social, management and financial and technical educational component

The conceptual and operational definitions of the indicators researched are presented in this section. There are 24 indicators in total, 10 defined by the Health Program through Water and Sanitation (PROSAGUAS), and 14 complementary ones defined by the team responsible for this research.

C) Conceptual Definition of the Researched Indicators

INCREASING OF HOUSEHOLDS SUPPLIED. Is the rate of increase that the systems have experienced since the starting of their operations up to the date of the research.

SATISFACTION WITH THE SERVICE. Is the extent to which a person agrees (is content, happy) with the type of water service that is presently receiving. The criterion taken by the system's managing organization is the amount of water received, if it is enough to satisfy the basic needs of the family.

PROJECTS THAT COUNT WITH AN OPERATOR-PLUMBER. Is the presence of one or several people employed by the system's managing organization who have been trained on the potable water system's operation, repairing and maintenance activities. The main activities are: leak reparations, making new residential connections, handling valve control, operate pumping systems, chlorinating water, meter reading and others.

WATER TREATMENT. It is considered by the amount of residual chlorine present in water, after having eliminated any bacteriological pollution, able to eliminate a possible contamination.

HOUSEHOLDS WITH LEAKS AT RESIDENTIAL CONNECTIONS. Is the existence of water waste at any part of the residential connection.

PARTICIPATION OF WOMEN IN MANAGING ORGANIZATIONS. Women who have participated in training processes in local and/or municipal organizations and that are currently part of the water systems managing organizations.

RELATION INCOME VERSUS EXPENSES. The average monthly income obtained from the water fees and other sources is greater than the average monthly expenses made for the system's maintenance.

DEFAULTING. It refers to users who do not pay the system's water service fee on the date established by the managing organization.

HYGIENIC HABITS. 75% of the population show an improvement in knowledge, attitudes and practices)⁷, as well as the use and maintenance of latrines. A healthy component may have several specific components, such as:

USE OF LATRINES. It refers to those latrines that show signs of being used.

PHYSICAL CONDITION OF LATRINES. The latrines built meet the health and technical standards established: Walls, Roof and Devices (seat and slab), in good condition.

CONTINUITY OF THE SERVICE. Is the continuity of the water service through time. It refers to the days of the week and hours of the day that the homes receive water.

CONTINUITY AT THE SOURCE. Is the maintenance of the level of service through the entire year, especially during the dry season. If this level is lower, it should not affect the communities, otherwise, it should be enough for basic needs.

WATER USERS' PERCEPTION ABOUT THE PERFORMANCE OF THE MANAGING ORGANIZATION. Is the opinion that users have about the quality and honesty of the work that the managing organizations perform.

⁷ For the purposes of this research, only the practices were investigated, since they reflect the knowledge and attitudes.

PREVAILANCE OF DIARRHEA. The existence of cases of diarrhea in homes researched during the day of the visit and in the last two weeks.

MORTALITY DUE TO DIARRHEA IN CHILDREN UNDER FIVE YEARS OF AGE DURING THE LAST FIVE YEARS. Is the existence of deaths due to diarrhea in children under five years of age.

EXISTENCE OF A TECHNICAL FILE. Existence of the document within the managing organization that contains the technical memoir of the water project, its designs and blueprints, and all the complementary technical information about it.

LEGAL REPRESENTATION OF THE MANAGING ORGANIZATION. Is the documented evidence that allows the community to be legally represented by the managing organization, and that empowers the organization to apply the regulations and statutes within the community.

EXISTENCE OF MANAGING REGULATIONS. The managing organization counts with internal regulations that reconcile the relationship between the users of the system, the people responsible of the organization, and other local institutions.

MAINTENANCE OF THE INITIAL FEE AS MINIMUM. It refers to the service fee that households pay for the access they have to the system. It is at least the one that was established when the system started operations.

INCREASE IN INITIAL FEE. It refers to the current fee that users pay for the service, being greater than the initial.

INCORPORATION OF NEW USERS. It refers to the number of new connections that the managing organizations have authorized as such, since the starting of the managing organization up to date.

SAVINGS. It is the money accumulated as surplus from the difference between operating costs (salaries, office supplies, purchase of chlorine, repairing materials, etc.), and the income generated at the moment of the research.

TABLA No. 2
Operational Definition Of The Program's Indicators

Issue	Indicator	Measuring unit	Source	Desired level
Increase of homes supplied	New users of water/total of homes supplied	Rate of growth in %	Managing organization	3%
Satisfaction with the service	Satisfied surveyed/total surveyed	% of surveyed with enough water	Home surveys	95%
Existence of operator-plumber	System w/ operator-plumber and tools/total of systems	% of systems with operator/plumber(s)	Technical diagnosis of inf.	100%
Water treatment	Systems w/0.1-0.5 mg.l/total systems	% of systems w/0.1-0.5 mg/l	Technical diagnosis of inf.	95%
Leaks at home taps	homes with leaks at connections/total of homes visited	% of homes with water waste at connection	Surveyed homes	10%
Defaulting	Defaulting users/total of users	% of defaulting	Accounting	Less than 10%
Participation of women in managing organization	Communities with 33% of women being part of the managing organization/total of communities	% communities with 33% of women being part of the managing organization	Interview to managing organization	100%
Relation ⁸ income/expenses	Managing organizations with monthly income greater than Expenses/total of managing organizations	% of managing organizations with income greater than the monthly expenses	Accounting study	100%
Hygienic habits	# of latrines in use/# of latrines visited	% of latrines used	Surveyed homes	90%
	>5 years of age using latrines/total >5 years of age	% >5 years of age using latrines	Surveyed homes	70%
	# of clean latrines/# latrines visited	% of clean latrines	Surveyed homes	70%
	homes with no superficial faeces/homes visited	% of homes with no superficial faeces	Surveyed homes	70%
	Homes with no risk of contamination from stored water/homes visited	% homes with no risk of contamination	Surveyed homes	70%
	Adequate construction of latrines	# of latrines in good shape/# latrines visited	% of latrines in good shape	Surveyed homes

⁸ Applies only to systems with piped water and that count with managing organization.

TABLE No. 3
Operational Definition Of Complementary Indicators

Issue	Operational indicator	Measuring unit	Source of data	Desired level
Continuity of service	Homes that receive water 7 days a week/total of homes visited	% homes that receive water 7 days a week	Surveyed homes	100%
Continuity of the source	Decrease of water in summer	% of homes with a water decrease in summer	Surveyed homes	100%
	Homes with not enough water for basic chores/total homes	% homes that receive less water during summer	Surveyed homes	0%
	Homes that receive water for basic chores/total homes	% of homes that receive water for basic chores	Surveyed homes	100%
Leaks on network	Systems with leaks/total of systems	% of systems with leaks on network	Observation of system	0%
Use of other sources	Homes using other sources/total homes	% of homes using other sources	Surveyed homes	0%
Occurrence of diarrhea	Homes reporting diarrhea the day of the visit on <5 year/total of homes	% of homes reporting diarrhea on day of visit	Surveyed homes	*
	Homes reporting diarrhea during last 15 days/total homes	% of homes reporting diarrhea during last 15 years	Surveyed homes	
Mortality due to diarrhea	Homes reporting death due to diarrhea last 5 years/total of homes	% of homes reporting death during the last 5 years	Surveyed homes	8/1000
Perception about the managing organization	Rate the board as good and excellent/ total surveyed	% surveyed rate between excellent and good	Surveyed homes	75%
	Surveyed say managing organizations are honest/total surveyed	% surveyed say managers are honest	Surveyed homes	
Opinion about acceptance of women participation in managing organization	Surveyed homes that accept female participation/total surveyed	% surveyed accept women participating in management	Surveyed homes	85%
Existence of file	Systems with technical files/total systems	% of systems with technical file	Infrastructure diagnosis	100%
Legal representation of managing organization	Managing organizations legally constituted/total of managing organizations	% of managing organizations legally constituted	Interview with managing organization	100%
Keep same initial fee	Managing organizations keep initial fee/total of managing organizations	% of managing organizations that keep initial fee		•
Increase in initial fee	Managing organizations have increased initial fee/total of managing organizations	% of managing organizations that increase fee		•
New users	Managing organizations that add new users/total managing organizations	% of managing organizations that have added new users		100%
Savings	Amount of money in Colonos	% of communities with savings		100%

* The purpose of the program is to reduce the occurrence of diarrhea by 26% in relation to the base line. However, this research lacks previous data, thus the inability to set a desired level. However, with the data obtained, the purpose was to know the current situation in order to have a parameter of comparison with future research.

• The data about the increase keeping of fees is considered based on the own system's conditions, therefore it is not possible to establish the desired levels. The contrary occurs when the fee experiences a decrease, since this could affect the financial availability to respond to future repairs.

• The data about increase keeping of the fees is considered based on the own system's conditions, therefore it is not possible to establish the desired levels. The contrary occurs when the fee experiences a decrease, since this could affect the financial availability to respond to future repairs.

D) ADDITIONAL RESEARCHED INDICATORS FOR COMMUNITY AND RESIDENTIAL WELLS

- Amount of existing wells in the community
- Amount of wells in operation
- Amount of wells that supply enough water
- Amount of wells with directing boards (applies only to community wells)
- Amount of wells with roofs
- Amount of wells protected by concrete slab
- Amount of communities where some members were trained on well repairs and maintenance
- Amount of communities that received a set of repairing tools
- Amount of communities that pay fees for so (applies only to community wells)

Source of data: surveyed homes (for residential wells) and interviews with leaders (community wells).

This chapter presents the findings per investigated indicator for the 55 researched systems. To the date of the research (June to October, 1998), fifty of them were operating and five were out of service. The findings have been grouped in five sections to facilitate their presentation. The grouping made is related to the type of indicator, the type of system, the type of managing organization found and the operational situation at the moment of the research. The sections refer to:

- ✓ The impact indicators researched;
- ✓ 36 systems - between electro-mechanical and gravity - that are providing a service and are managed by the beneficiary communities;
- ✓ 6 systems that are not managed exclusively by the communities (2 managed by ANDA, 1 by the municipality and 3 by the community-municipality);
- ✓ 8 systems between wells with hand pumps for residential and community usage that are managed by the communities; and
- ✓ 5 systems that are out of service (4 by electro-mechanical pumping and 1 with hand pump for community usage).

The researched impact indicators are related with diarrheic diseases of children under five years of age, and the results are referred to a universe of 55 systems.

The group of 36 systems that are providing a service and that are managed by the beneficiary communities account for 65.5% of the researched universe. The findings per systems per indicator and institution found are presented in Annex 1. One important aspect to highlight in this group of systems is that despite the lack of a technical training accompanying those situations that go beyond the local capacity, the communities have assumed with responsibility their management, operation and maintenance. The global results found in the 36 systems managed by the communities show that only 0.3% of the surveyed homes report having had death of children under five years of age due to diarrhea during the last five years. 88% of the beneficiary households that were surveyed are satisfied with the water service they receive. 94% of the homes are using the latrines; 68% of them were found clean. It was found

that 30 managing organizations gave legal representation and that the remaining 6 are in the process of obtaining theirs. 35% count with managerial regulations for the system. There has been an increase in homes supplied with water of around 9.5%, compared with the initial number of homes supplied⁹. The total savings accrued by the 36 systems to date is more than 1.2 million colones, amount that ratifies the foresight that the communities have towards a search for the sustainability of the service provided to this date by the water systems. A summary of the findings per indicator and institution for this group can be appreciated in Annex 5.

In the 6 systems that are providing the service but are not exclusively managed by the beneficiary communities, the research was limited to some indicators, especially in the technical and managerial components. Those systems were built in the urban areas of the same number of municipalities, 2 of which are managed by ANDA, the municipality manages 1 and the community and the municipality jointly manage 3 of them. CARE executed all these systems. The cases of 0% mortality among children under five years of age in the last five years were among these systems. 100% of homes are using the latrines, and children older than five years of age are using latrines in 99% of the homes. Satisfaction with the service reached 94%. 4 of the systems have not modified the fees and in just one system it was possible to have access to records in order to know the level of savings. Furthermore, in 4 systems the increase of new users has reached 20%. Details of the findings for this group of systems is contained in Annex No. 2.

In the case of systems with hand pumps for residential and community usage researched (3 and 6 systems respectively), one of the systems for community usage is out of service, hence the analysis of this group is referred to 8 systems. In this group, 93% of the households are using the latrines that were built. 87% of children older than five years of age are making use of the latrines. 68% of the latrines are clean, and 71% of the households are free of human faeces in the surroundings. Regarding the homes supplied with wells and hand pumps for residential usage, 92% of them are satisfied while those supplied from wells with hand pumps for community usage, just 60% of the homes are satisfied. Annex No. 3 contains the data per indicator found in this group.

⁹ This percentage is deemed to be greater, since some managing organizations do not count with records to allow the proper identification of new users. All of them recognize a greater number of users than initially, but for the purpose of this report the data included comes from those that keep records.

The global results found in the 36 systems managed by the communities show that only 0.3% of the surveyed homes report having had death of children under five years of age due to diarrhea during the last five years. 88% of the beneficiary households that were surveyed are satisfied with the water service they receive. 94% of the homes are using the latrines; 68% of them were found clean. It was found that 30 managing organizations gave legal representation and that the remaining 6 are in the process of obtaining theirs.

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For the 5 systems that are out of service, the research was limited to a situational diagnosis for each one of them about their surroundings, not including the sanitation component and other indicators. This was due to the level of motivation showed by the beneficiary and local leaders did not allow their involvement in the research process.

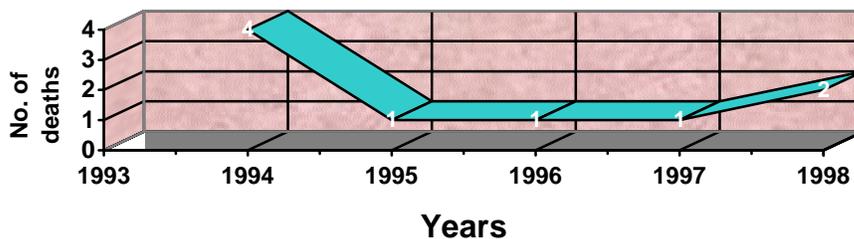
Regarding the homes supplied with wells and hand pumps for residential usage, 92% of them are satisfied while those supplied from wells with hand pumps for community usage, just 60% of the homes are satisfied.

IMPACT INDICATORS

Mortality among children under five years of age due to diarrhea

The minimum goals for the Americas in the program "Health for all in the year 2000", a mortality rate for children under one year of age is 30/1000, and a mortality rate for children from 1-4 years of age below 2.4/1000. The document Proposed Guidelines for the Reform of the Health System in El Salvador, presented by the National Commission on Health, of February 1999, the mortality rate reported for the age group of 1 to 4 years of age is 8/1000 live births. The same source points out that the three main causes of death in this age group are in order of significance, respiratory illnesses, intestinal parasites and diarrhea.

Mortality among children under 5 years of age due to diarrhea



The mortality rate due to diarrhea in the surveyed households was 0.9/1000, in a sample of 2162 five years olds found in the homes visited during the rainy season in 1998. This rate is way below the mortality rate established in the goals for the Americas and by the National Health Commission.

It was also found that mortality decreased 50% in 1998 in relation to 1994, year in which some of the researched water and sanitation systems started their operations.

It is worth mentioning that some other contributing factors in the improvement of the quality of life of this population group shall be studied in order to determine the impact of the interventions on this reduction.

The mortality rate due to diarrhea in the surveyed households was 0.9/1000, in a sample of 2162 five years olds found in the homes visited during the rainy season in 1998. This rate is way below the mortality rate established in the goals for the Americas and by the National Health Commission.

Prevailing of diarrheic diseases¹⁰

It is not possible to know exactly in what proportion the provision of water and sanitary infrastructure through the 55 systems have contributed in the reduction of diarrheic diseases and in the death among children under five years of age due to this cause. This is due to the lack of a base line that would allow a comparison of the findings. What beneficiaries express is that children become less sick and that the death cases reported due to this cause are low.

The prevailing of diarrheic diseases in the systems considered show a frequency distribution as the one shown in the following table. It is worth noting from this table that in 26 systems of the 55 researched, it was found that: from 16% to 30% of homes report cases of diarrhea in children under five years of age. Likewise, the average percentage by community reporting at least one case of diarrhea is 27.7%.

TABLE NO. 4
Percentage of homes reporting cases of diarrhea per system

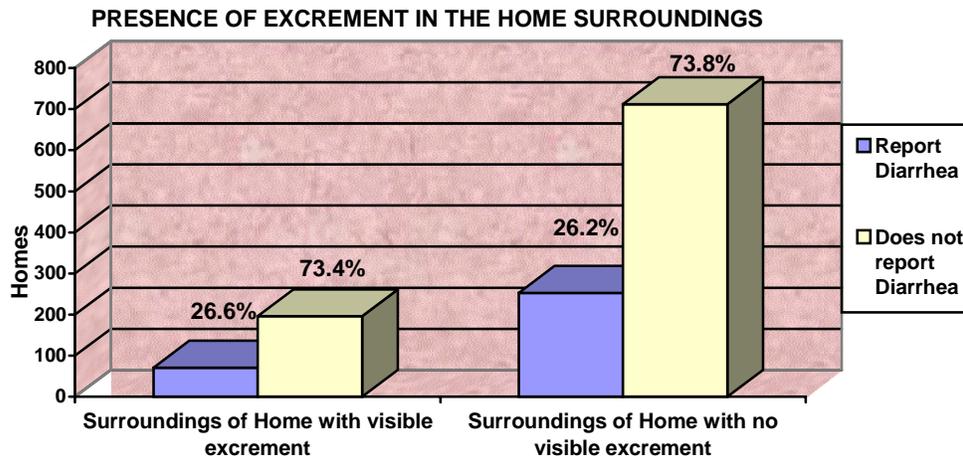
% of homes reporting cases of diarrhea	# systems (frequency)
0 - 7	4
8 - 15	6
16 - 22	13
23 - 30	13
31 - 37	3
38 - 45	4
46 - 53	4
54 - 63	4
64 - 71	1
Total	52*

* Data not available for 3 communities

There are several factors and behaviors that affect the prevailing of diarrheic diseases among children under 5 years of age. Some of them, that have a direct relation with the water and sanitation systems, have been considered in this research. Among the predominant ones are: presence of human faeces in the surrounding of homes, the storage and handling of drinking water, the continuity of the service, and the presence of residual chlorine in the water supplied by the systems.

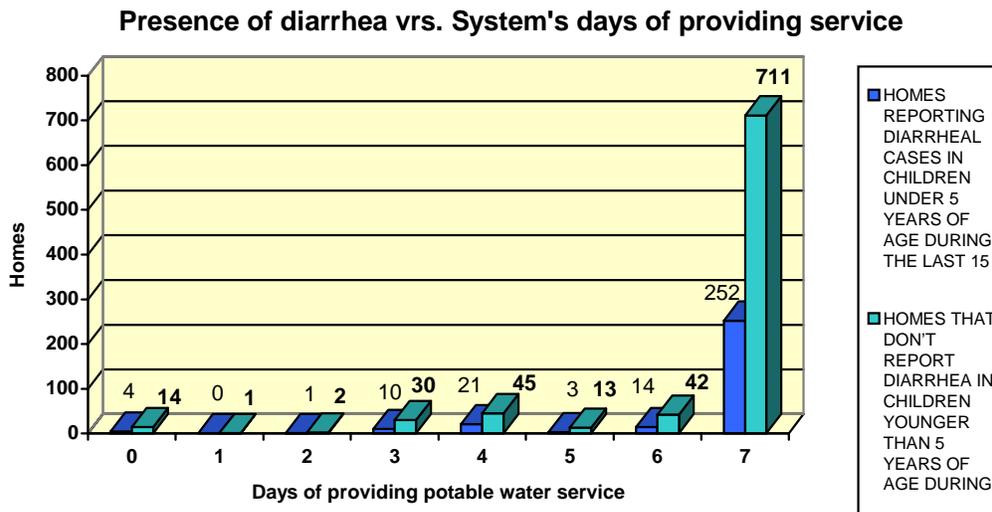
The following chart shows the number of homes that were surveyed that have visible faeces around the house, and the same report cases of diarrhea among children under five years of age during the last 15 days before the visit. The same chart shows the ones that do not report cases of diarrhea during the same period.

¹⁰ For the purpose of this research, "prevailing" of cases of diarrhea in children under five years of age means the ones reported by households in the last 15 days will be used.



Another researched factor is the continuity of the water service. The following chart shows the number of homes that report receiving water between zero and seven days a week. Homes reporting not having cases of diarrhea among children under five years of age during the last 15 days before the survey are also shown. For instance, of 963 homes that receive water 7 days a week, 711 report no diarrhea and 253 report cases of diarrhea during the last 15 days.

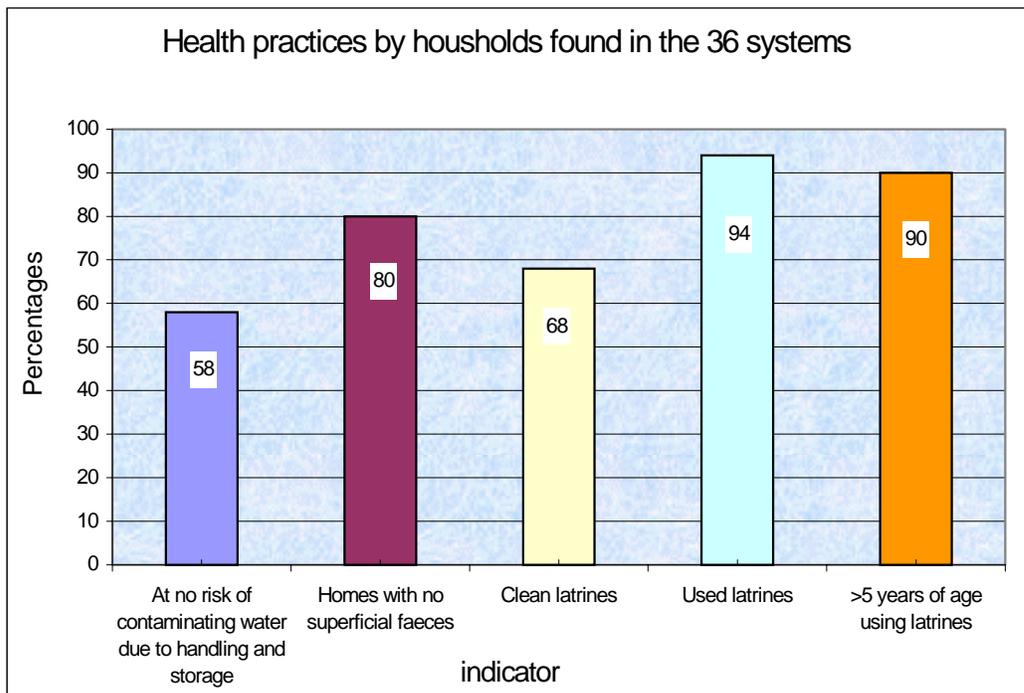
Another factor researched is the level of residual chlorine found. Of the 55 systems, 24 report presence of residual chlorine. None was found in 16 of the systems, no information was gathered from 2 of them, in another 5 it is not applicable because they are out of service, and 8 of the systems do not chlorinate because they use water wells.



**FINDINGS FROM THE 36 SYSTEMS THAT WERE OPERATING,
AND WHICH ARE MANAGED BY THE COMMUNITIES.**

✓ Indicator for the Health Education Component

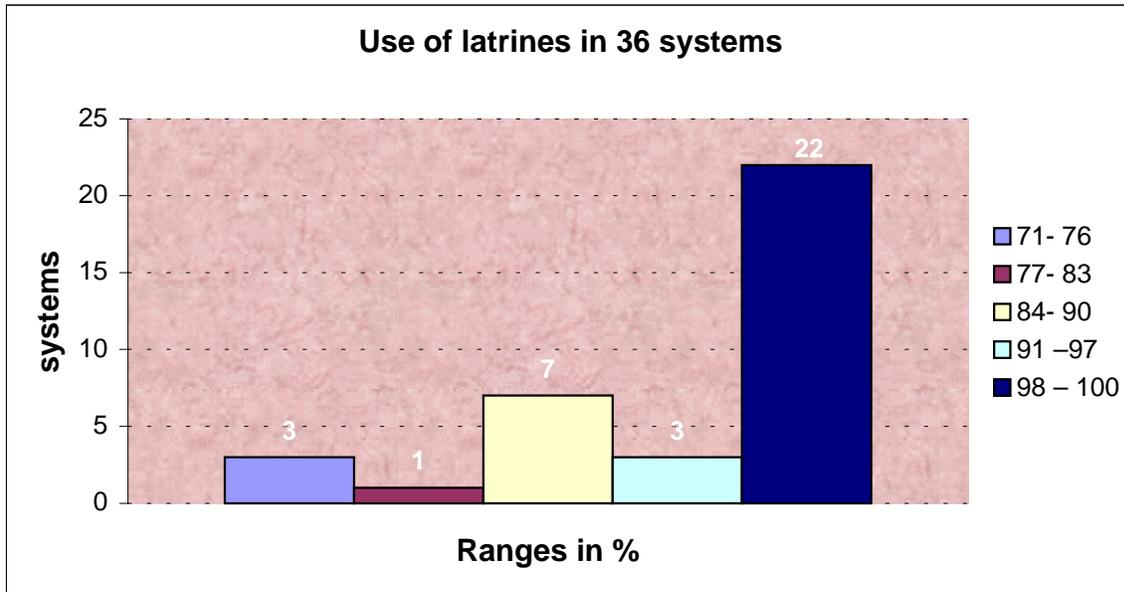
Findings per researched indicator in this component are summarized in the following chart. The results show that the hygienic habits practiced by the beneficiaries of the researched systems are positive. 94% of the households are making use of the latrines. Following is a detailed analysis per indicator.



Use of latrines

The sanitary infrastructure built is being used by the families subject of the intervention. A global average of 94% of the homes within this group of systems is using latrines.

As it can be seen in the following chart, in 36 of the systems, 70% of the homes use latrines. In fact, 69% of the communities present percentage of usage of latrines between 90% and 100%.



Children older than 5 years of age use Latrines

The use of the latrine is not enough, this has to be used by the majority or all of the members of the household. This practice has an true incidence on collective sanitation since all households within a community share the risks from defecating outdoors.

The percentage of usage of latrines found among children older than five years of age was above 70% of homes in 35 of the 36 systems. The average percentage found in the 36 communities was 91%. In 15 of the communities, 100% of children older than five years of age use the latrines.

TABLE NO. 5
Percentage of homes where children older than 5 years of age use latrines per system

<u>% Homes</u>	<u># Systems</u>	<u>% Systems</u>
56-62	1	3
63-69	0	0
70-76	3	8
77-83	4	11
84-90	6	17
91-97	7	19
98-100	15	42
Total	36	100

The presence of anal cleaning material in the interior of the latrine booth presents some risk of vectors. However, to throw it within the cesspool is a difficult practice to be adopted by the family because they consider that the latrine would have a shorter useful life.

Clean latrines

Likewise, the cleanliness of the latrines is also one indicator of the hygienic habits practiced by households. The presence of anal cleaning material in the interior of the latrine booth presents some risk of vectors. However, to throw it within the cesspool is a difficult practice to be adopted by the family because they consider that the latrine would have a shorter useful life. Though, the advantages and disadvantages of this practice is still in discussion by governmental and non-governmental institutions.

In 21 of 36 communities, 70% or more of the homes kept clean latrines, with no papers or excreta, the day of the visit.

TABLE NO. 6
Percentage of homes per system that keep their latrines clean

% Homes	# Systems	% Systems
33-42	2	6
43-52	3	8
53-62	4	11
63-72	9	25
73-82	11	31
83-92	3	8
93-100	4	11
Total	36	100

Presence of faeces on the floor of the house

Another relevant aspect to be considered is the disposal of excreta by children under five years of age that do not use latrines. If the family does not dispose of small children's faeces in the latrine, there is a greater risk of contamination. The results found in this item are satisfactory, since 86% of the communities present the 70% or more homes with no human faeces on the floor, either in the patios or around the latrines. The average percentage of homes in the 36 communities with no faeces on the floor was 80%.

If the family does not deposit small children faeces in the latrines, the risk of contamination is greater.

TABLE NO. 7
Percentage of homes per system that keep no faeces on the floor

% Homes	# Systems	% Systems
40-48	3	8
49-57	1	3
58-66	2	6
67-75	6	17
76-84	9	25
85-93	7	19
94-100	8	22
Total	36	100

Homes at no risk of water contamination due to handling and storage

Water may contribute to reduce gastrointestinal diseases, but it may be also a transmission vehicle for pathogenic agents. The contamination of water may occur at the source of origin or at the house, due to mishandling and storage. For the handling, the focus of attention was the type of container use to collect it, and for storage, besides focusing on the container, attention was given to the place of storage, its cleanliness and protection against dust.

Water contamination may occur at the source of origin or in the house, due to mishandling and improper storage.

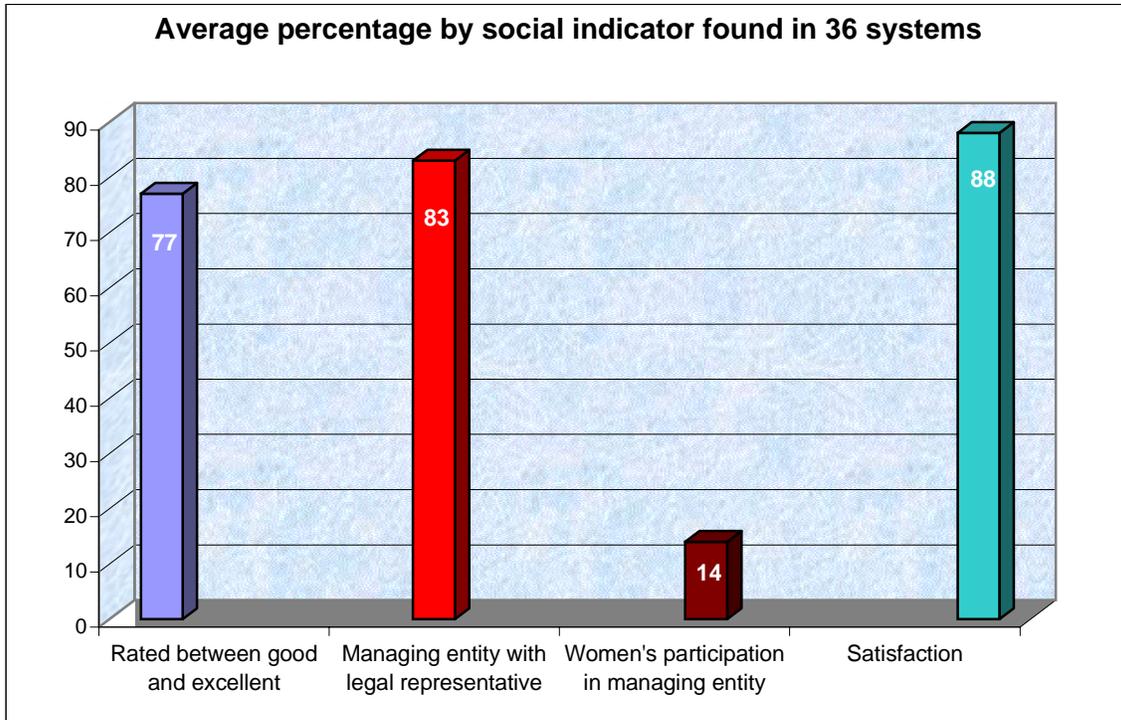
In 44% of the communities, it was found that 70% or more of the communities were at no risk of water contamination due to handling and storage (see table No. 8). The average percentage found in the 36 communities was 62% of homes with no risk of contamination.

Table No. 8
Percentage of homes at no risk of
water contamination due to handling
and storage

% Homes	# Systems	% Systems
10-22	1	3
23-35	2	6
36-48	3	8
49-61	13	36
62-74	8	22
75-87	4	11
88-100	5	14
Total	36	100

✓ Indicators for the Social Component

For the social component, the key indicators that were researched were those that affect the rural water and sanitation systems sustainability, as well as some indicators that even though are not determined for the sustainability, they presented an interest to the research team. The following chart shows four of the social indicators that were researched. Among them, the one referred to the participation of women in the managing organization calls the attention. It was found that only 14% of the members of the managing organizations are women. It is important to find that 77% of the homes that are using the systems rate the managing organization between good and excellent. 88% are satisfied with the level of service they receive.



Satisfaction with the service

The satisfaction with the water service has several determining factors and it shows the quality of the work performed by the local institutions responsible for their administration. For instance, people expressed that if the water is enough to satisfy their basic needs they are satisfied. The criterion used for satisfaction is the amount of water they receive and the length of the period of service: days a week and hours a day. 67% (24) of the communities present a satisfaction rate of 95% and 100% with the quality of the service provided. The average percentage found for satisfaction in the 36 communities was 88%.

It was found that only 14% of the members of the managing organizations are women. It is important to find that 77% of the homes that are using the systems rate the managing organization between good and excellent. 88% are satisfied with the level of service they receive.

Participation of women in the managing organization

There are women present in the managing organizations only in 58% (21) of the communities, and there are only men managing in 42% (15) of the systems. Of the 21 systems where there was participation of women in the managing organization, 25% of them present a structure of participation of women of 33% and greater, and the rest presents a lower percentage.

TABLE NO. 9
Percentage of female participation in
the researched systems

% Women	# Systems	% Systems
0	15	42
9-17	3	8
18-26	8	22
28-36	2	6
37-45	2	6
46-54	3	8
55-63	0	0
64-72	3	8
total	36	100

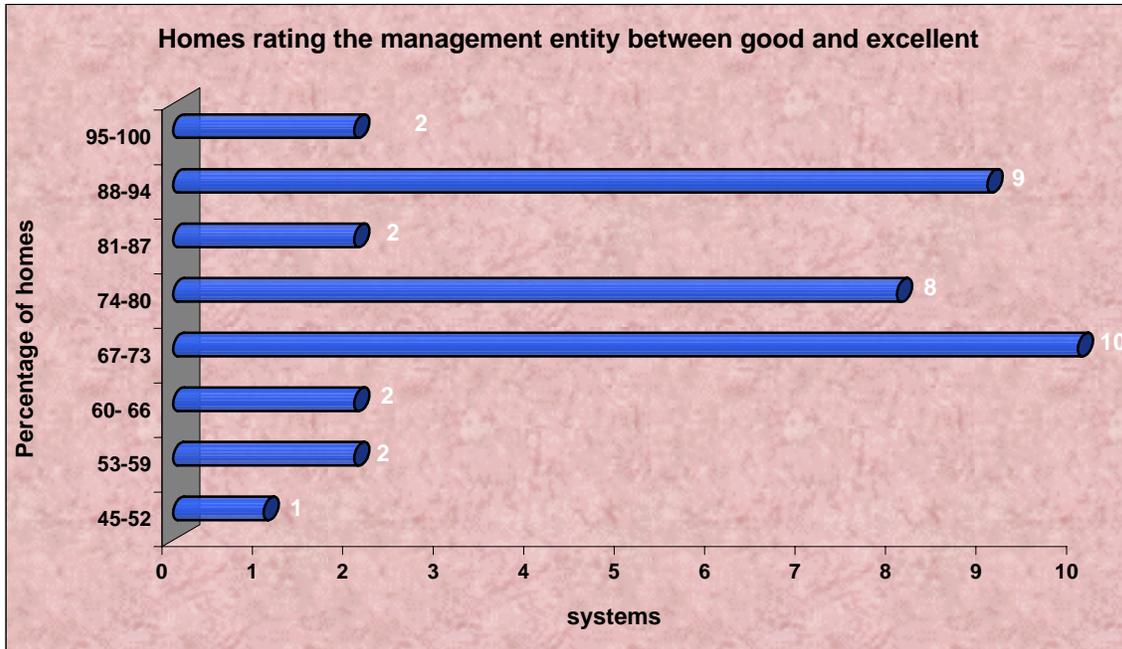
The executing institutions placed an emphasis in involving women during the execution of the project and the installation of the managing organization. But once these institutions left, women went back to “traditional” activities because conflicts of interest start between home, community and cultural patterns. This no doubt indicates that maybe efforts shall be focused in persuading changes in attitude in men before than in women, or to make a deeper research on the issue.

Perception of users about the work performed by the managing organizations

The opinion that users hold about the managing organizations is in no doubt an indicator of the level of trust users have on their elected leaders. The importance of this social indicator resides in its incidence on other indicators, such as late payment, leaks at taps, willingness to pay when these are raised. Among others, also, not less important such as the willingness to become involved in activities related to the system and other areas of community development.

The results found are shown in the chart above, in which 77% is the average percentage of rating between excellent and good found in the 36 communities. 28% of the communities (10) present percentages between 67% and 73%, and 22% are between 74% or 80% of homes rate the work performed by the managing organization as excellent and good.

Of the 21 systems were female participation in the managing organization was present, 25% of them present a structure of participation of women of 33% and greater, and the rest presents a lower percentage.



Managing organizations with legal representation

The legal constitution of the managing organizations is a social indicator that somehow shows the managing ability of the people left responsible to manage the systems, since the executing institutions in most of the cases were no longer present up to the end of the process. 83% (30) of the organizations have legal representation issued by the municipal council and their statutes were published in the Official Journal. 17% (6) communities are still in the process of becoming of legal constitution.

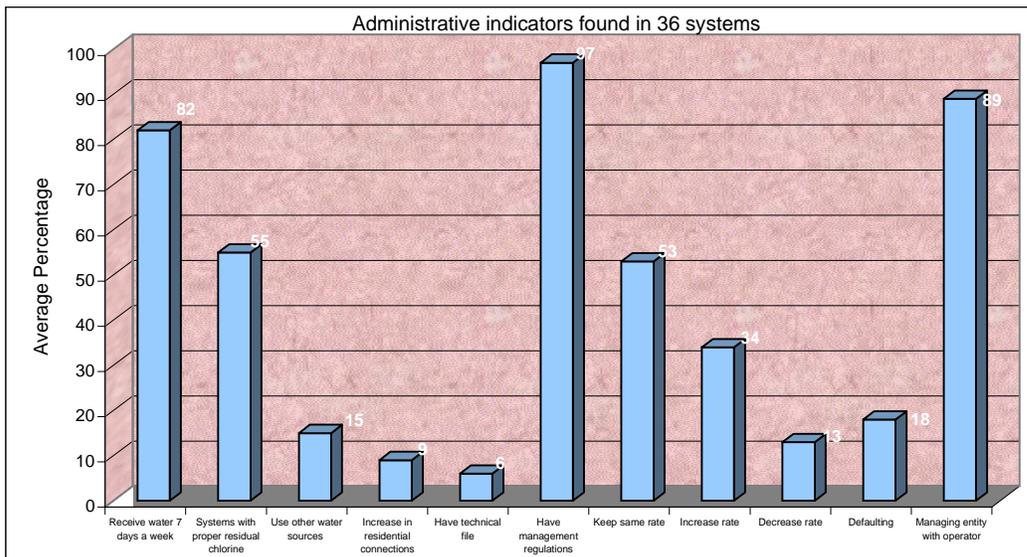
Obtaining a legal framework that allows the communities to be legally represented by a group of leaders, is one aspect that lets the local managing organizations operate within a legal framework as well as to apply and manage the internal regulations around the water systems. Furthermore, it gives them legal status from which their work is strengthened.

Obtaining a legal status will contribute somehow to the process of legalization of assets, one aspect in which most of them have some difficulties due to the delay in the processes and some pending conflicts not resolved with real state vendors or donors.

✓ Indicators for the Managerial and Financial Component

The findings per researched indicator in this component show that the managing organizations are making efforts to manage the systems properly. Many managing organizations, with prior approval from the general assemblies, have made complementary investments in the systems. Among relevant aspects found, some of them have bought land and have built management offices, have extended the infrastructure left previously by the institutions in order to provide shelter for the plumber, others have bought spare pumping systems for the ones left by the project. This level of managerial performance found in many of the systems give proof of the level of commitment, management ability and sustainable vision that the communities have developed in such a short period of time.

The following chart shows some managerial findings in the 36 systems that provide service and which are being managed by the communities.



From these findings, the data on defaulting found should be understood as the number of users who had not paid on time during the last three months of the administration. However, the systems' management regulation establishes a period of 3 months for beneficiary households for defaulting before negotiating between the parties. Taking this internal disposition into account, the data found on defaulting are within the range allowed by local management.

Another important aspect found is that most of the managing organizations do not count with files and other related technical information, although it is known that such information was provided by the executing institutions to many of these communities. However, the present managing organizations do not count with that supporting information on the systems. In the future, this could become a restriction for the systems' operation and maintenance.

Relation Income versus Expenses

It was found that a group of 27 of the communities show incomes greater than the expenses, this according to the average of the last three months of management. 4 resulted with greater expenses, but three of them have considerable savings, which means that expenses on operation and maintenance affected the flow of expenses during the last three months. One of the four has a very low level of savings, which means that over the time it has kept a tight difference between income and expenses.

Furthermore, it was found that 5 of the systems (4 by gravity and one with pumping), do not keep income and expenses vouchers, and only the one with pumping system show a small saving (¢1,160.00).

In summary, 30 systems out of 36 were found showing greater incomes than expenses, and this situation allows for some funds for major maintenance, and 6 of the systems (17%) present difficulties.

Basically, the expenses made cover the payments for electricity in the systems that operate with pumps, and for salaries of 117 persons employed in the 36 systems.

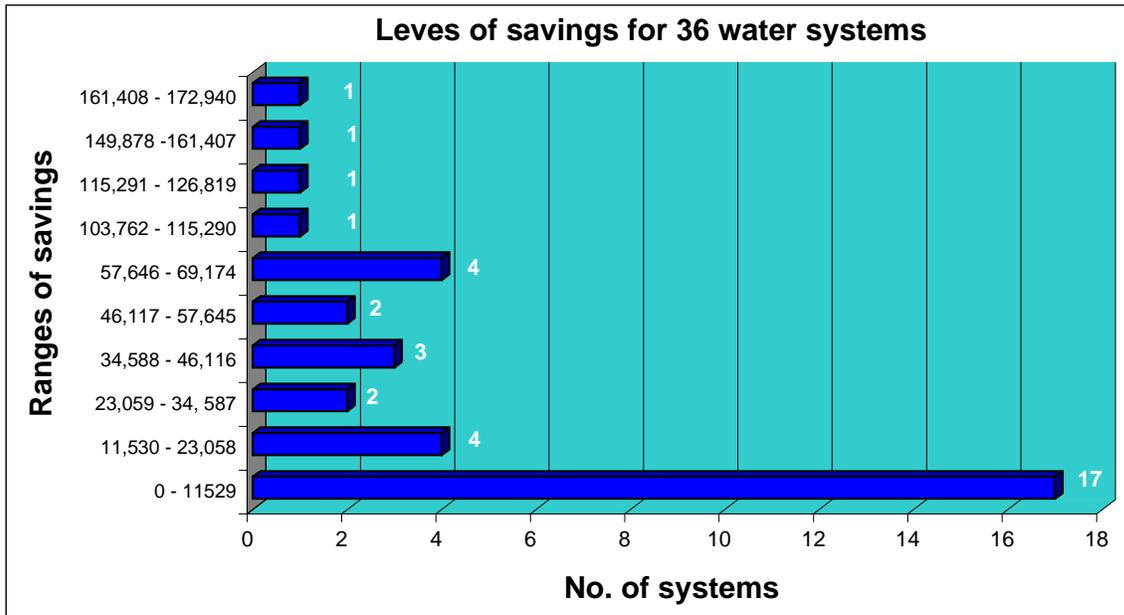
Savings

47% of the systems (17 out of 36) present a range of savings from ¢0.00 to ¢11,529.00. Of the systems that fall within this range, 70% (12) operate by gravity and 30% (5) operate with pumps.

11% (4) of the systems show a range of savings from ¢11,530.00 to ¢23,058.00, of these, 2 of the systems operate by gravity and two operate with pumps. 6% (2) are between ¢23,058.00 to ¢34,587.00, of which one is operated by gravity and one operates with pumps. The following chart further exemplifies the findings for this indicator.

In summary, 30 systems out of 36 were found showing greater incomes than expenses, and this situation allows for some funds for major maintenance, and 6 of the systems (17%) present difficulties.

The average savings in the 36 communities are ₡33,560.00 (see Annex No. 7 on savings per type of system and by community).



Three factors have influenced the existent level of savings: the “culture of payment” adopted by the families in the rural areas, the maintaining or increase of fees left by the executing institutions, and the establishment of adequate fees. The fees were technically established to replace the equipment once it reaches the end of its useful life, foreseeing the community’s capacity to perform that activity.

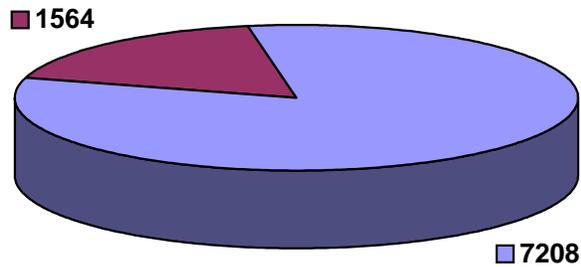
Regarding the culture of payment, it was found that 82% of the user pay on time the water fee and 18% pay overdue.

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Defaulting

The delay in payment that is called defaulting, up to now has not affected the water service since the communities have enough savings to face any contingency.

Behavior of payments by users of the water service



■ Users paying on time ■ Users paying overdue

Increase or reduction fees

Regarding the behavior of payment, the results show that 53% (19) of the systems maintain the same fee, 33% (12) have increased the fee and 14% (5) have reduced the fees. This shows stability and control by the managing organizations before the constant pressure applied by members of some of the communities to lower the fees. The main cause that has made the communities increase the fee for water service is the increase experienced by the cost of electricity, after the country’s privatization of this service (up to 58% in some cases). The effect that these types of increases may have on the water and sanitation systems sustainability, specially on the ones operated by electro-mechanical pumping are unpredictable. Up to this moment, the communities are making their maximum effort.

It was found in 28 of the 36 systems that 84% to 100% of homes receive water seven days a week. The average percentage from the 36 systems that receive water seven days a week is 82%.

Existence of trained plumber operator

Most of the systems count with personnel dully trained on the operation of the equipment and the repairing of damages on any point of the system. In some small systems, just one person performs both functions. Further, it was found that several communities have hired full time administrative personnel. This allows the managing organization to function as a supervisor for the process and to have more time available for management. In some of the systems that benefit more than 500 households, CARE provided computing equipment and installed the software (El Dorado) and trained people on its use for the process of invoicing.

89% (32) of the systems count with operator and/or plumber dully trained. 11% (4) lack this type of personnel due to the fact that they do not have enough income to pay salaries, hence the repairs are performed by some of the members of the community or directors that have been trained. The lack of a person in charge of the operational and maintenance duties may be affecting the quality of the service that is currently provided.

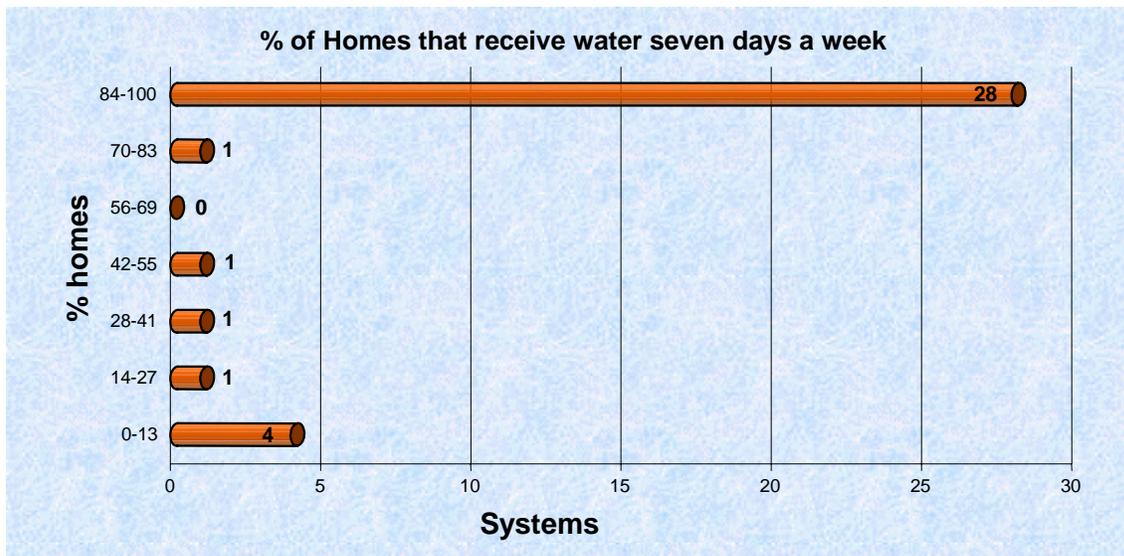
Count with technical files

One factor that has had a true affect on the work that the operator-plumbers are performing is the lack of the technical file, since only two of the communities count with this document in a complete fashion, although, some communities do count with the blueprints or plans. The three executing institutions provided those documents to many of the communities and even municipalities.

Service quality

Although the hours per day is an important indicator, the days of the week are even more since it shows the capacity the systems have to supply water or the internal agreements the communities have been forced to reach due to the increase in electricity fees. 100% of the homes in the 36 systems receive water from two to seven days a week.

It was found in 28 of the 36 systems that 84% to 100% of homes receive water seven days a week. The average percentage from the 36 systems that receive water seven days a week is 82%.



Water treatment

Not only abundant water is needed for reducing diarrheic diseases, but this has to present certain quality indicators such as odorless, colorless, free of organic and inorganic substances. This diagnosis does not include a physical-chemical and bacteriological water analysis of the water supplied by the systems visited. However, samples of residual chlorine were taken in order to determine the existence of a water treatment practice.

Adequate levels of residual chlorine were found in 56% (20) of the systems analyzed and the remaining 44% (16) do not present an adequate level of residual chlorine. It is necessary to mention that in the latter group, some systems do not practice any treatment and some practice the treatment but apply inadequate chlorine doses. In some communities, the technology for water treatment implemented by the executing institutions has ceased to function due to the lack of spare parts or repairing service in the local markets. In some cases, plumbers are using hand-chlorinating systems, while repairing or substituting the one that is out of service.

Continuity of the source

The protection of the water sources in the long term is not a priority for the local managing organizations, since only one community is performing interventions for the preservation of the mini-basin in coordination with the Peace Corps Volunteers.

With the interest of exploring about this issue, the homes affected by the reduction of water during the dry season were researched¹¹. Analyzing the results obtained, it is possible to establish that 19% (7) of the communities have a deficient service during the dry season, reason why they urgently need interventions geared towards improving the preservation of the water resource in the recharge area of the wells that supply the system.

Increase of residential connections

The managing organizations have increased the number of residential connections in 9.5%. It was found that only in 50% of the systems the managing organizations keep records of the initial connections and the new user homes. This situation restricted the knowledge about the real value of the increase that the systems have experienced.

¹¹ All of them experience a decrease in water service during the dry season, but the interest was to establish how this reduction in water service affected the satisfaction of the basic needs: hygiene, drinking, etc

TABLE NO. 10
Percentage of increase in
connections in 36 systems

Behavior	Connections
Initial	8009
Increase	759
Total	8768

Most of the systems were designed with an annual rate of increase of 3% in geometric projection, but many users already considered in the designs did not participate in the execution of the same. However, these users were connected later, situation that shows a percentage above of the design project.

✓ Indicators for the Technical Construction Component

The findings defined specifically by the assessing team are the only ones shown in this section. However, other further specified aspects that were found are included in the respective individual reports per researched system.

Leaks in network

Leaks in the distribution network were found in 33% of the systems (12). Some of them are construction flows (for example, shallow ditches for PVC pipe in areas of heavy traffic). No leaks were found in 24 of the systems during the round made.

Leaks in taps (residential connections)

The percentages of leaks in residential connections are very low, which shows that the families are taking care of the water by repairing damaged taps. Only 5% of homes show leaks in taps.

Physical condition of latrines

The executing institutions built quality sanitary infrastructure. In 97% of the communities (35) between 90 % to 100% of the latrines were found in good physical condition.

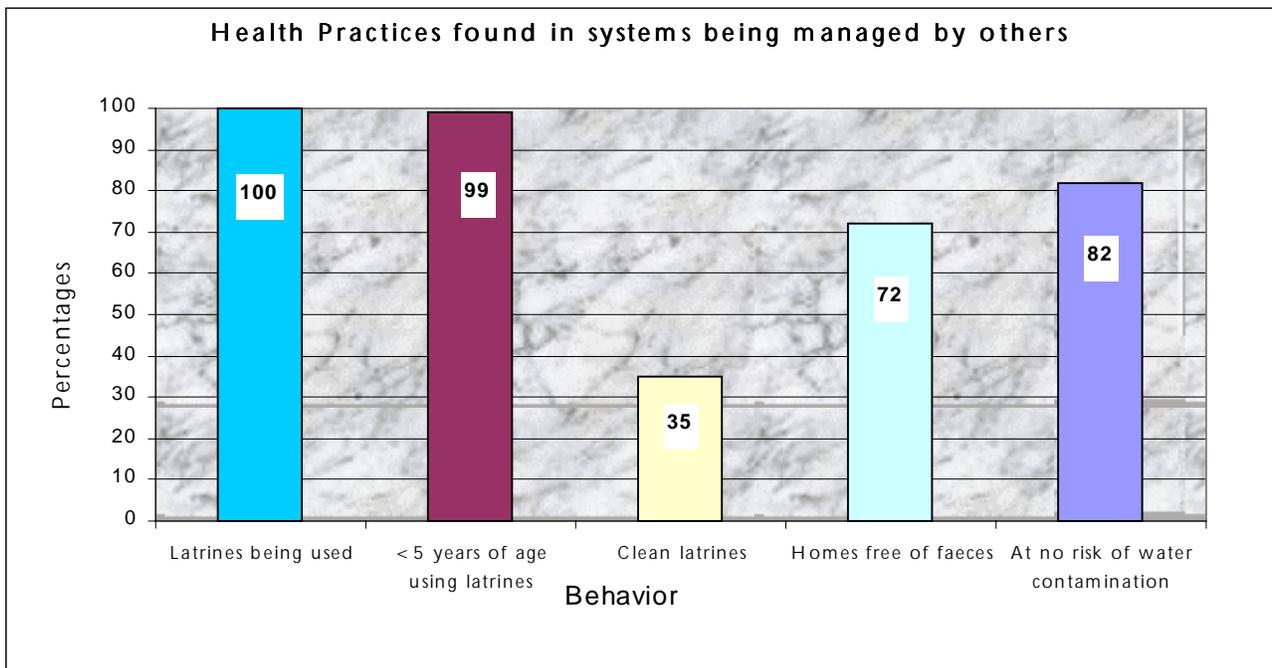
The executing institutions built quality sanitary infrastructure. In 97% of the communities (35) between 90 % to 100% of the latrines were found in good physical condition.

FINDINGS IN INDICATORS FOR 6 SYSTEMS NOT EXCLUSIVELY MANAGED BY THE BENEFICIARY COMMUNITIES

✓ Indicators for Health Education

The following chart shows the results found in the 6 systems that are providing the service but which are not exclusively managed by the user communities. CARE built the six systems, and are all located in the urban areas of the municipalities, some were rehabilitated and other were brand new constructions. Two of them are managed by ANDA, the municipality manages one and three are managed jointly by the municipality in coordination with the community.

The results obtained in the previous analysis of the 36 communities, and those found in the systems managed by the municipality and the community (co-managed model), lead to the conclusion that said model requires major analysis in order to continue implementing it. It looks as though better results are perceived when only the community or the municipality perform the management activities.



Hygienic habits

Of the five indicators about hygienic habits studied in the 6 communities, four of them were found positively high. The indicator found negatively low was “latrine cleanliness”. According to the data obtained, a trend of greater cleanliness may be observed in the rural areas than in the urban areas. In the six communities researched, only Joateca offered high results as function of the indicator in question, founding that 78.6% of the households with clean latrines. This is different from the other communities that show values way below those percentages, which could be seen reflected in the resulting media for the 6 percentages: 35%. One aspect to be considered is that the 6 communities are located in urban areas and that when the water systems were built (except Arambala), the coverage of latrines was high. For this reason few latrines were built and hence, the educational program about usage and maintenance did not cover the homes with older latrines. The average percentage about the use of latrines for the 6 communities is 100%. Their use by children older than five years of age is 99%. The average percentage for homes with no superficial faeces is 72%. The average percentage for homes at no risk of water contamination due to handling and storage is 82%.

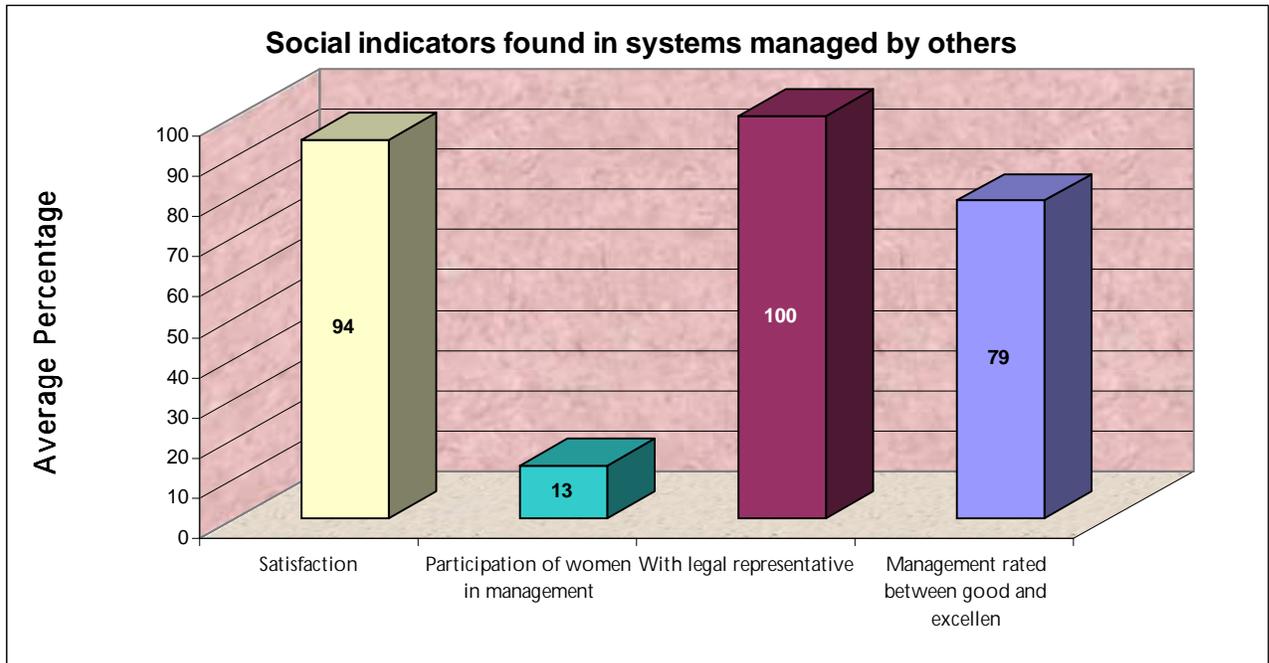
According to the data obtained, a trend of greater cleanliness may be observed in the rural areas than in the urban areas.

TABLE NO. 11
Hygienic Habits found per system

Community	Managing organization	% homes				
		Latrines in use	>5 years of age using latrines	Clean latrines	Homes w/n superficial faeces	At no risk of water contamination
Arambala	ALCALDIA	100	100	10	60	80
Joateca	ALCALDIA/ COMUNIDAD	100	95	78.6	92.9	85.7
Perquín	ALCALDIA/ COMUNIDAD	100	100	58.3	66.7	75
Ereguayquín	ALCALDIA/ COMUNIDAD	100	99.3	27.8	72.2	91.7
Villa El Triunfo	ANDA	100	97.7	37	79	84
Nueva Granada	ANDA	98.1	99.2	32.7	63.5	73.1
Average		100	99	Median 35	72	82

✓ Social Indicators

The findings for the social component in this group of systems do not vary much from the ones for the rural systems managed by users. The average percentages found for those indicators were obtained from the systems that are managed by the municipality or by the combination of municipalities and the community.



Satisfaction

The families are satisfied with the quality of the service rendered. They consider that the quantity of water they receive is enough to satisfy their needs. In four communities (Arambala, Perquín, Villa El Triunfo and Ereguayquín) the satisfaction rate is 100%. In one (Nueva Granada) it is 94%. The community that shows a lower level of satisfaction was Joateca, 71% of the homes are satisfied with the quantity of water they receive. The source that is being exploited by this community does not produce enough water, and that is why the managing organization is performing soil preservation works and agro-forestall practices in the recharge area.

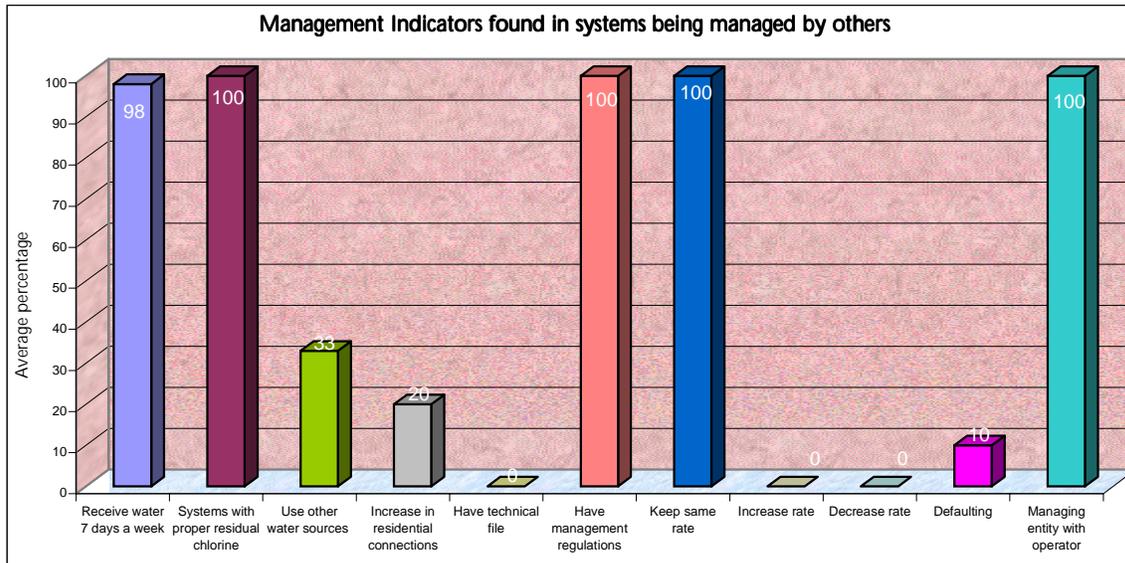
Perception about the managing organizations¹²

Users give a good rate to the work performed by the managing organizations. En Arambala the system is managed by the municipality and 90% of the users rate the work performed by the managing organization as good and excellent.

In Joateca and Ereguayquín, the systems are managed by the municipality and by members of the beneficiary community. 78.6% and 85.7% respectively give a rating of good and excellent to the managing organization.

¹² This indicator as well as for the others, was not obtained for the systems managed by ANDA. For this reason only 4 systems will be mentioned in these cases.

The lowest percentage given was in Perquín. The municipality and the community manage this system, and only 63.6% consider the work between good and excellent. There is certain political polarization in this community that does not allow the community to see the system as a “common good”.



In each of the three systems with co-managerial models, one of the two parties, personnel from the Municipality or community representatives, take the leadership and make administrative decisions. In Joateca, the community representatives took the leadership. In Ereguayquín and Perquín, the Municipality has taken the leadership.

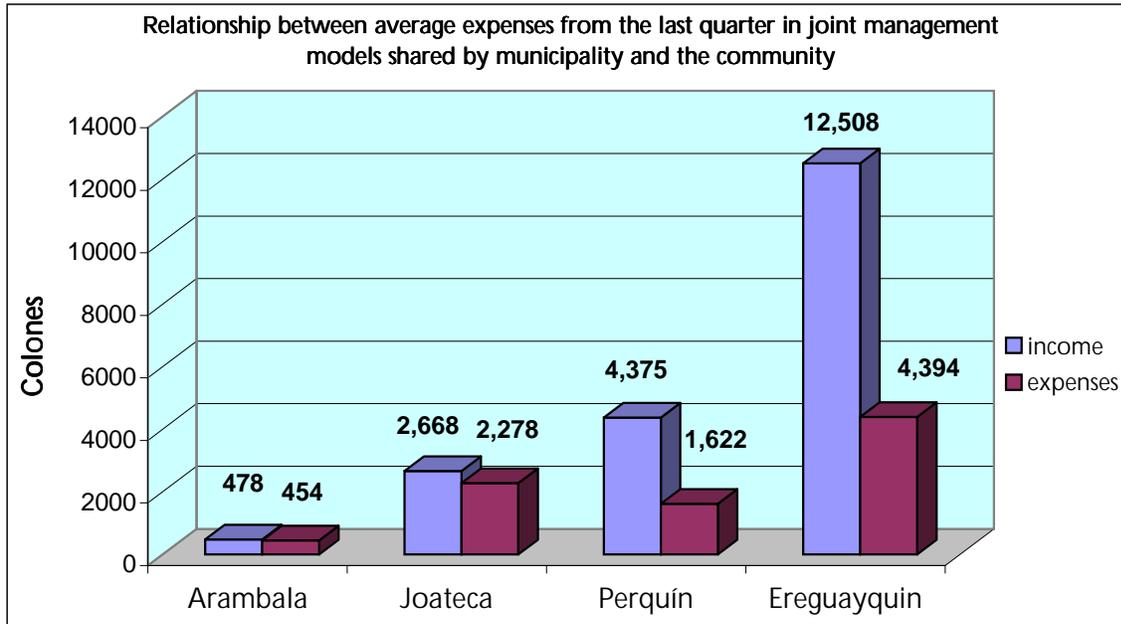
✓ Administrative-managerial and financial indicators

The results of the research for this component and for this group of systems were limited especially for the ones managed by ANDA and the municipalities, since given the management model, not all the required information was gathered.

Incomes versus expenses and savings

The data about this indicator was obtained only for four of the systems. The income is greater than the expenses in these four systems. However, in two of them (Joateca and Arambala) there is a minimum difference. A fact found in 3 systems where the Municipality is involved is that the proceedings from the payments for the service go the municipal coffers without a separate entry for its control, and these funds are used when they need to make a repair.

This situation involves the possibility of creating and controlling the savings or a particular fund that may be used when there is a need for substituting equipment or performing mayor maintenance. Since the leadership was taken by users representatives in Joateca, this community shows a level of savings equal to ₡12,718 colones to be used exclusively for the water systems needs.



Three indicators call the attention due to the differences with the systems managed exclusively by the community. All of them keep the same initial fee; the defaulting percentage is slightly small (10% is the general average for the four communities), and the increase in connections is significant (20%).

There are several aspects that influence these findings. The change of fee may involve a political cost in terms of the Mayor's re-election efforts. Therefore, they prefer to cover the costs using the municipal funds. Although there may not be a need to increase the fee, and this would be believable in a greater extent for the systems operated by gravity (Arambala and Joateca), but less so for the systems operated by pumps (Ereguayquín and Perquín) due to the increase in electricity costs.

The low level of defaulting found is possibly due to the fact that the fees are affordable to most of the families and/or that the municipality represents an institution with a greater legal support and recognition as the local government.

The lower costs and the greater flexibility regarding connection fees established by the managing organization may be affecting the increase experienced in the number of connections. The following table shows the data that was gathered from each one of the managing organizations that had them available.

TABLE NO. 12
Relationship Income - expenses versus behavior of payment and fees for the water service in communities with the systems managed by the Municipality and jointly by the Municipality-Community

Community	Income from last quarter	Expenses from last quarter	Savings	Users	Defaulting %	Initial fee	Current fee
Arambala	478	454	Municipal fund.	53	15 28	10.5	10.5
Joateca	2,668	2,278	12,718.93	143	6 4	15	15
Perquín	4,375	1,622	Municipal fund.	135	27 20	35	35
Ereguayquín	12,508	4,394	Municipal fund.	294	20 7	21.95	21.95
Total	20,029	8748	12,718.93	625	68 10	4 keep same fee	

Operator plumber

There are four systems that count with one operator and/or plumber trained for operating and/or repairing damages. In three of the systems the Municipal employee assigned to that task each month performs the collection activity. One of the systems has hired part time personnel to collect fees and to keep records of entries and exits.

Quality of the service

98% of the households in the 6 communities receive water seven days a week, however, the service hours are different. Arambala and Ereguayquín receive between 13 to 24 hours a day, Villa El Triunfo and Nueva Granada receive water between 11 to 12 hours, and Perquín and Joateca between 2 to 4 hours.

Furthermore, proper residual chlorine concentrations were found in the four communities where these analyses were performed (none were performed in the systems managed by ANDA). The municipality keeps a greater coordination with state institutions for obtaining chlorine.

✓ Technical Construction Indicators

Leaks in the network and residential taps

None of the systems researched present leaks in the distribution network. The managers expressed that the systems were very well built and do not present major problems.

No leaks at residential taps were found in households belonging to two of the systems, minor leaks were found in 10% of the households from two of the systems, and in others between 13% to 25% of households present leaks at residential taps.

Physical condition of latrines

In this group of systems 75% of the latrines were found in good physical condition, and 25% present some deficiencies.

FINDINGS IN INDICATORS FOR IMPROVED RESIDENTIAL AND COMMUNITY WELLS WITH HAND PUMPS

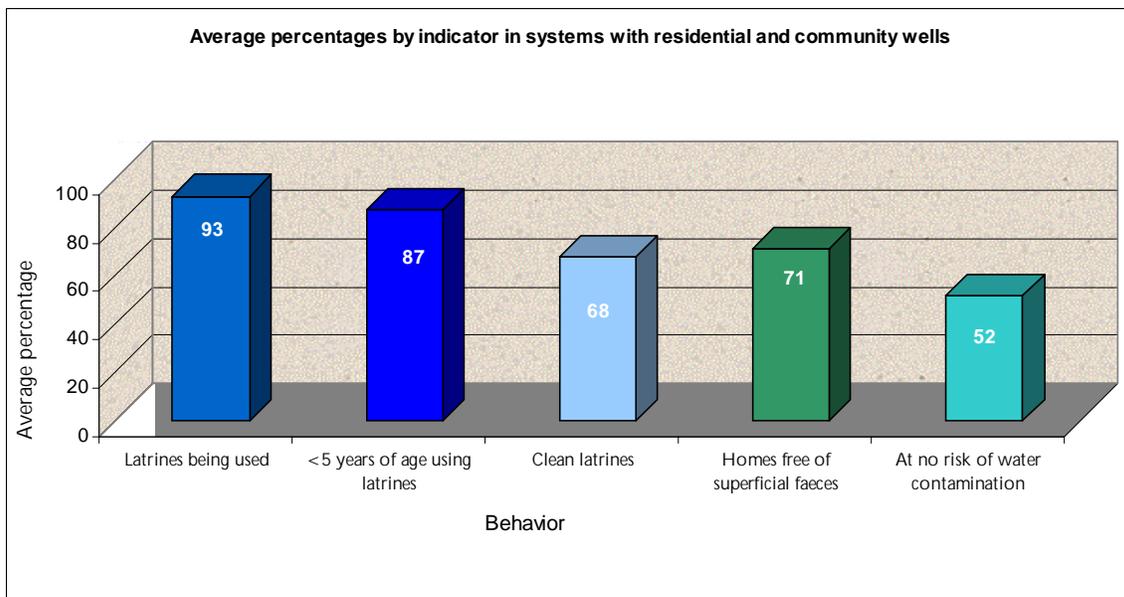
The research was initially geared toward 9 systems, 3 systems with artisan wells improved with residential hand pumps and 6 systems improved with community hand pumps. The findings for this group refer only to 8 of the systems since one for community usage was found out of service.

✓ Indicators for the Health Education Component

Hygienic habits

The habits related to usage and maintenance of latrines show high levels. The average usage of latrines found in the eight communities was 93%, the usage of latrines for children over five years of age was 87%, and clean latrines show 68%. The behavior observed that best showed the hygienical practices at home was the presence of superficial human excreta. Regarding this issue, an average from the eight communities was 71% found free of superficial faeces.

One indicator that was found low is the risk of water contamination due to handling and storage. An average of 52% from the 8 communities does not present a risk of contamination. The remaining 48% show considerable exposure to water related diseases due to mishandling and improper storage of drinking water, plus the lack of water treatment by the families.



✓ Indicators for the Social Component

The households benefited with the improvement of residential homes are satisfied with the technology provided because they consider it time saving as well as less prone to generate risk of water contamination since the wells are watertight proof by means of a concrete slab. In Metayate, 100% of the interviewed expressed that the water from the well is enough to meet their needs. In Chilamates (Nueva Concepción) and San Dionisio, 85.2% and 90% are satisfied with the service. Furthermore, 48% has built roofs for protection. Of the three systems considered as pilots at that moment, 2 (Metayate and Los Chilamates, in Chalatenango) consisted of hand excavated wells operating with hand mecate type pumps; and 1 (urban area of San Dionisio, in Usulután) consisted of hand excavated wells operated by hand Mayan pumps. No organizational model was promoted among these systems, since the solution was of an individual type per household.

Regarding community wells (20 observed in the 5 systems), it was found that the families that get water supplied from 12 wells are satisfied, and that the families supplied from the other 8 wells say that the water they receive is not enough. On the other hand, the managing boards established for the management of the community wells have dissolved in 3 communities, and 2 communities maintain the boards but just to manage, at the most, own well per each community. The leaders expressed that the community does not wish to pay the rate established for water usage; instead they want to make a one-time payment when the pump stops running. However, there are three factors that make difficult to repair damaged pumps: the lack of dismounting tools, at least for the Mark II; the availability of water in other artisan wells, and the lack of a “formal” organization responsible for the repayment of pumps. Nonetheless, there is a positive factor and that is the existence of trained people in all the communities able to repair the pumps.

The rope and Mayan pumps installed in residential wells were 93% were found in operation. Furthermore, 98% of them were protected with watertight concrete slabs. Regarding community wells, 75% of them are operating.

✓ Indicators for the Technical Construction Component

The rope and Mayan pumps installed in residential wells were 93% were found in operation. Furthermore, 98% of them were protected with watertight concrete slabs. Additionally, the families interviewed expressed that there are people in the community trained and with the tools needed to make repairs. The families are

responsible for buying the spare parts and for paying the work. This cost is not high due to the technology implemented, which is easy to repair.

Regarding community wells, 75% of them are operating and 30% have a roof. Most of the wells out of service are MARK II pump; this technology is more difficult to repair. More details may be seen in Annex No. 3.

FINDINGS IN SYSTEMS THAT WERE FOUND OUT OF SERVICE

It was not possible to perform the complete research for this group of systems due to two main reasons: a) the systems were not operating at the moment of the research, and b) the communities showed a low level of participation due to the lack of the water service.

TABLE NO. 13
Systems that were out of service at the moment of the research

No	Name of system	Type of system	Executor
1	Santa Clara	Pumping-gravity	PCI
2	Santa Cruz Porrillo	Pumping	PCI
3	San Pablo Cañales	Pumping	PCI
4	La Cruzadilla	Hand pumping	PCI
5	El Tablón	Pumping	CARE

SANTA CLARA, J/SAN VICENTE

This system was built by PCI and the projected number of households to be benefited was between 300 and 400. At the moment of the researched only 44 of them were receiving the service by gravity from the source of supply. This was possible because of their short distance from the source. Due to the system's projection and the small number of homes benefited, the team responsible for the researched has placed this system in the category of out of service.

Synthesis

Only 11% of the connections have received water. They belong to San Jeronimo neighborhood. The works were finished, but due to the delay of almost one year by the electricity distributor company of the area the system was damaged in some sections. There are 500 meters of impelling pipeline that supplies the re-pumping sub-station, which at the moment of the research was being repaired by PCI. Because of this situation, one of the distribution tanks that will supply a great part of the projected population is still not operating. In some sections of the impelling line, the ditch depth for laying pipe were approximately 40 cms, situation that has caused damage to some line sections due to the effect of the heavy traffic.

Even though the system's inauguration was on June 1997, only the percentage of households cited have received water service and have acquired the pumping equipment approximately one month and a half before the execution of the research. The community was making repairs at the moment of the research in order to start up the system. A precise assessment of the physical conditions of the system's main sections was not possible due to its non-operational situation.

SANTA CRUZ PORRILLO J/TECOLUCA, SAN VICENTE

The system was found at 95% of progress in the execution of its infrastructure at the moment of the research. The only pending things for installation are some residential connections, repairs on some pipe sections with leaks, and the hydraulic tests. Those activities will take approximately 3 weeks to 1 month. The projected population is around 350 households.

It was not possible to assess the operation of the system from a construction point of view, only the designs for the electro-mechanical works and for the distribution network could be assessed. These designs meet the established standards. Some aspects related to other components were researched, especially the financial information that currently keeps the board of the community. It was not possible to research some aspects related to the social, managerial and health components due to the same condition found in the potable water system and the effect that this has on the motivation of the members of the community. This system started operations one month after the field research. At the moment of editing this report, the community has been able to operate the system and it is providing a service to the population.

SAN PABLO CAÑALES J/SAN ILDEFONSO, SAN VICENTE.

This system was found out of service. Numerous leaks were found on the distribution network when the system started operating, and only about 15 homes out of the 50 ones connected to it were able to receive initially the water, deficiently. The construction stage of water system was not finished entirely, situation that made impossible to assess the works and the quality of the service. If we compare the number of homes that received deficiently the water at the beginning of operations, with the number of homes projected (340), it is only 4%. Due to the situation found at the moment of the assessment, this system belongs to the group out of service. Likewise the other systems described in this section, the research for this one was a situational one around the water infrastructure, and no other component was explored.

The European Union program Basic Hygiene and Sanitation (HIBASA) built this system, with an economic donation from PCI, and with USAID's funds. PCI's intervention was limited to the partial purchase of materials, while HIBASA assumed the technical direction. At the moment of the final edition of this report and according to comments made by PCI directorate, its institution was seeking solutions and making repairs with its own funds.

The community, with its limited resources, is making a lot of efforts in order to complete the system and to put it again in operation.

LA CRUZADILLA, CANTON CALDERAS, J/ APASTEPEQUE, SAN VICENTE

The system consists of three excavated wells equipped with MARK II hand pumps, manure producing latrines and cesspool latrines. This system was projected to benefit the population from La Bóveda, La Infancia and La Cruzadilla neighborhoods.

The pumps in the three wells were out of service at the moment of the research. Two of them have been out of service since six months ago and one since one month. The families are extracting water with a bucket from two of the wells, the third one is not used because it does not have enough water. According to community leaders, the community has not been able to repair the pumps because they do not know how and due to the lack of support among the community members.

EL TABLÓN, J/ PASAQUINA, LA UNION

CARE built this system, and it operates with electro-mechanical pumping. The well yields 1.9 liters per second, which is not enough for the 198 households connected to the systems and which currently demand 2.23 l/s, and a projected demand of 3.6 l/s in 20 years. The design criteria for this system have affected its operation, being unable to operate efficiently since the beginning. The initial equipment was a pump with a 5 HP motor, with a capacity of 28 gallons per minute. A pump with a 7 1/2 HP substituted this equipment, with a capacity of 35 gallons per minute. Months later, the community decided to buy, with its own funds and no technical counseling, a pumping equipment driven by a 30 HP motor, with a greater capacity of 100 gallons per minute. This equipment overworked the well and did not solve the system's operational problems. As a result of new activities performed by the community, CARE was responsible for cleaning, developing and assessing again the well, and reinstalled the pumping equipment bought by the community, which only operated a few days.

At the moment of the research, 100% of the population lacked the water service since May 1998. At the moment of the edition of this report, the system was operating as result of the efforts of the community.

ANALYSIS OF SOME OF THE FINDINGS

An analysis of key indicators for the managerial-financial and health areas is carried out in the following section, where the principal trends and degree of correlation existent among the variables are studied.

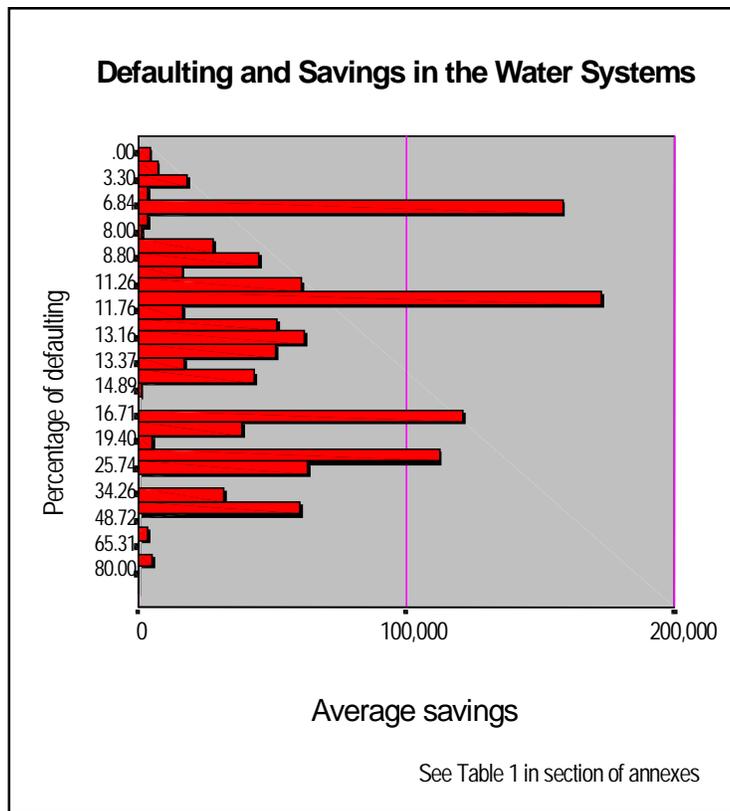
The purpose of this section is to make generalizations based on the findings and to determine the functional relations that would allow the implementation of a technical assistance system that considers the results presented here.

MANAGERIAL-FINANCIAL AREA

Analysis of the systems' Defaulting and Savings percentages.

Two of the key variables for understanding the financial situation of the potable water systems are the level of defaulting in which the users incurred for not paying the service on the due date. The other aspect to consider is how this delay can affect the savings the managing organizations may reach after paying the operating and administrative costs.

A high defaulting rate could mean a low level of savings, situation, which could jeopardize the system's sustainability in the long range. This is would affect the system's ability to make substitutions or repayments of some of its components, such as electro-mechanical pumps, electric energy transformers, cleaning of wells, etc.



If the managing organizations do not produce savings, the life of the system could end by not being able to find the financial resources to face eventualities or programmed processes (the life of a pump in normal conditions is estimated at ten years).

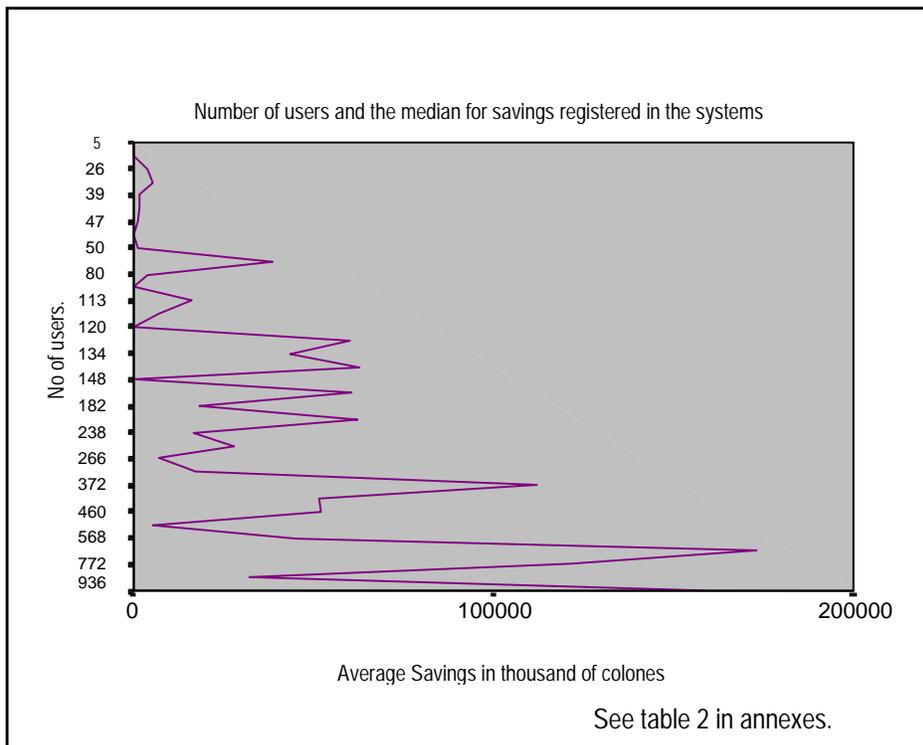
For the case of the 36¹³ systems described here the Graphic 1 shows no evidence of a pattern or trend that directly relates the extent of defaulting with the amounts saved. What this graphic shows is that when the defaulting reaches 50% onward, the savings tend to decrease with a marked emphasis, and in these cases it is fundamental to start a process of collecting past-due accounts. When the defaulting level reaches over 10% it is necessary to review the mechanisms of recovery in order to avoid problems in the level of savings.

Savings and the Number of Beneficiary Families

The variable number of families plus the proper rate constitute the major projector of savings with which the managing boards count with to their favor or against them, accordingly.

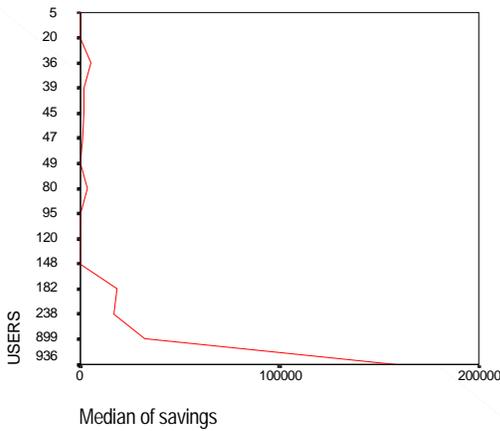
The following graphic describes this better.

Number of users and the median for savings registered in the systems

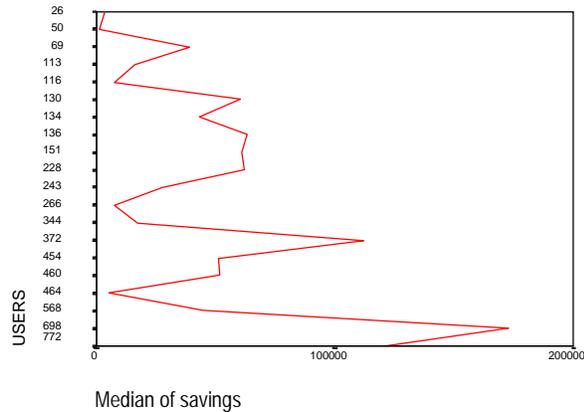


There is a combination of systems in this analysis, which could be producing some kind of biased conclusions. A presentation for type of systems follows in order to evidence that bias, where the trend is kept.

Users and level of savings of the systems operated by gravity

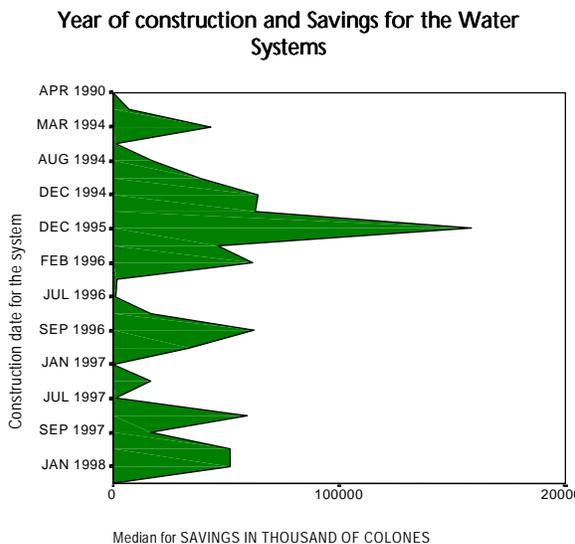


Users and level of savings for the systems operated with pumps



A better analysis was performed for the water rates in the systems operated with pumps, which were differentiated by the installation of water meters of those operated by gravity, where such analysis presented greater flexibility.

Type of construction and Savings



Another factor that could be affecting the level of savings that other water managing organizations have is the systems construction date. A system with greater amount of years would be expected to show a greater level of savings.

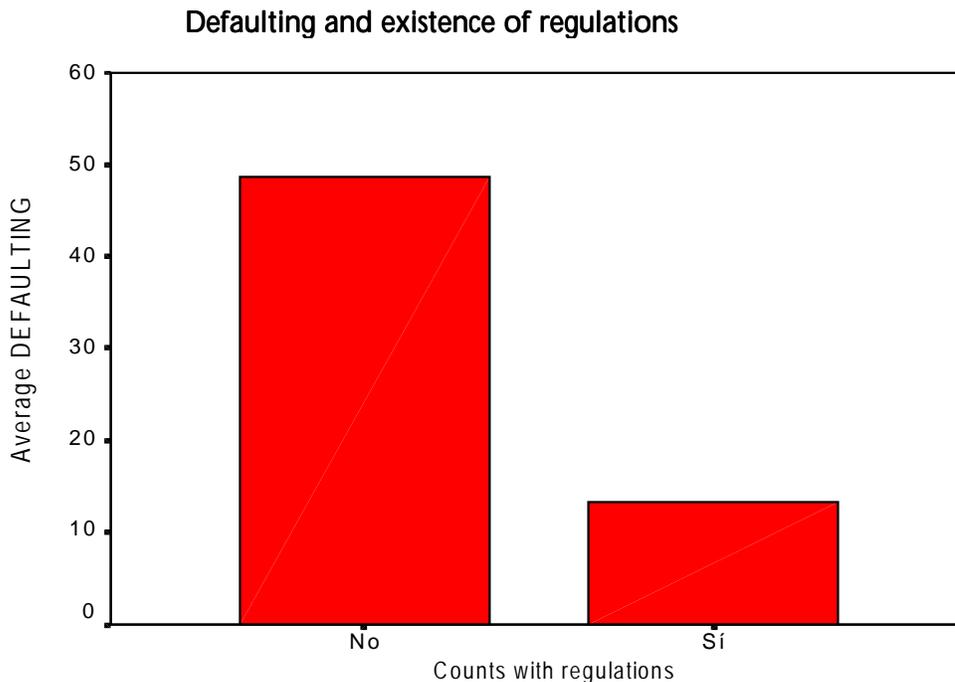
¹³ This data refers to Systems Managed by users.

However, when analyzing the graphic at the side, it can be seen that there is no direct relationship between the system's construction date and the amount of savings the water managing organization reaches. Thus, a system built in March 1994 has approximately the same amount of savings than one built in June 1998.

Existence of Regulations and Defaulting

The Water Managing Organizations should count with internal regulations that govern the service provided to users and that detail the rights as well as the responsibilities they have. One of the areas that should be regulated is the users' obligation to be up to date with the payment of water rates, and at the same times define penalties to be applied in those cases.

The following graphic shows the difference in the average defaulting between the water systems that count with internal regulations and the only case that does not count with one.



The results of this graphic can not be generalized since there is only one system without regulations.

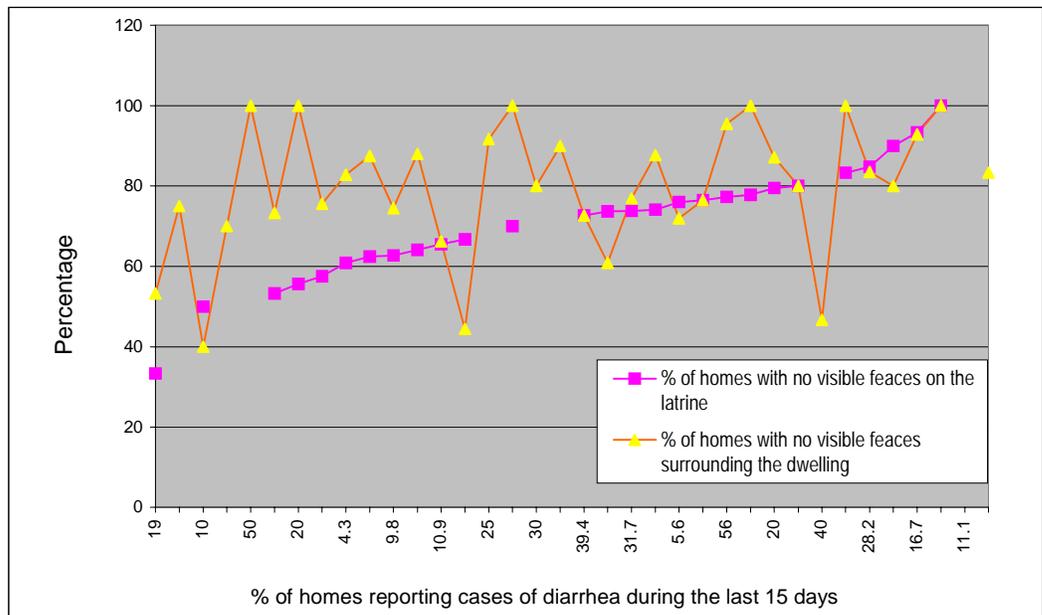
HEALTH AREA

Influence of superficial faeces and clean latrines in the percentage of homes reporting cases of diarrhea in children younger than five years of age during the last fifteen days.

One of the variables that affect the occurrence of diarrheic diseases among children, particularly among children younger than five years of age, is the improper disposition of human excrements. The lack of latrines or of sanitary education binds the members of the community to defecate in any place, generating ideal conditions for the vicious cycle anus-hand-mouth that produces the well-known morbidity rates per disease.

Another factor that is closely related to this picture is the proper maintenance given to latrines, their cleanliness (free of faeces), in order to avoid the issues mentioned above.

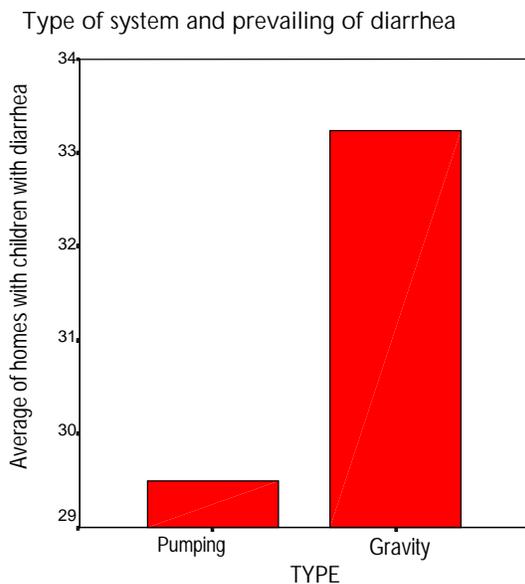
Clean latrines without faeces and homes reporting diarrheal cases in the last 15 days



The analysis of these variables that are charted above show no evidence of a significant relationship between the percentage of homes that keep clean latrines, the percentage of homes found with no superficial faeces, and the percentage of homes reporting children with diarrhea during the last fifteen days.

This graphic shows that despite the fact that in the last ordered pair there is an increase in the homes with no superficial faeces, with a percentage close to 100% (it is an excellent average for this variable). In the X-axis we find that 70% of the households report having sick children due to diarrhea during the last fifteen days (the highest registered percentage). Likewise, the case of clean latrines may be observed, where despite the increase in % of homes that report diarrhea among children (X axis), it seems there are no significant changes in the cleanness of the sanitary systems (Y axis).

% of homes reporting cases of diarrhea during the last 15 days and type of system



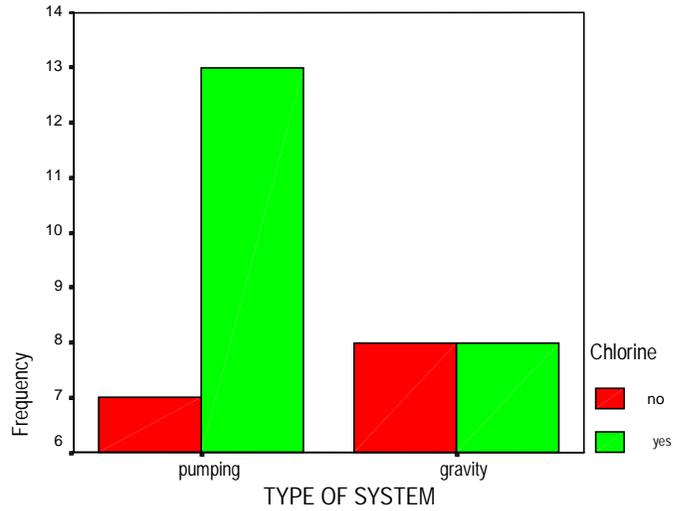
When examining the influence of the type of system on the % of homes that report cases of diarrhea in children younger than five years of age, the greater proportion belongs to the systems operated by gravity.

There may be several hypotheses for explaining this phenomenon and that could be explored in this field:

1. The systems operated by gravity, for having superficial sources such as springs of water and other types, are more exposed to contamination than the systems operated by pumps, where the water is mainly underground and thus better protected.

2. Many pumping systems were built with automatic chlorinating devices, which has facilitated the process of potabilization. The chart above shows a greater effort for chlorinating in the systems operated by pumps than in the systems operated by gravity.

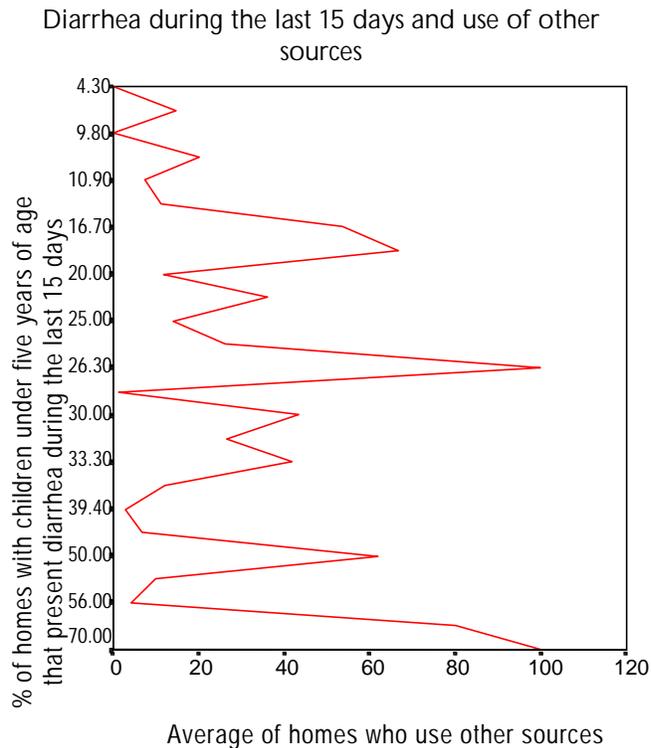
Situation of chlorinating efforts by water systems per type of system



% of homes with children under five years of age and percentage of homes that use other sources.

Many potable water systems due to technical deficiencies or for other reason do not supply homes continuously during the twelve months of the year. Families are forced to use other type of sources in order to meet their domestic needs, being exposed to water related diseases. Among them, diarrheic diseases that affect particularly children.

Certain level of correlation is found when analyzing these two variables, and it can be seen in the following chart.



The above information marks an increase trend in homes with children that present diarrhea during the last 15 days, as these homes are supplied from other water sources. Thus, in the first data from the graphic at the side, a low percentage of homes with children with diarrhea may be observed, while there is 0% of usage of other sources.

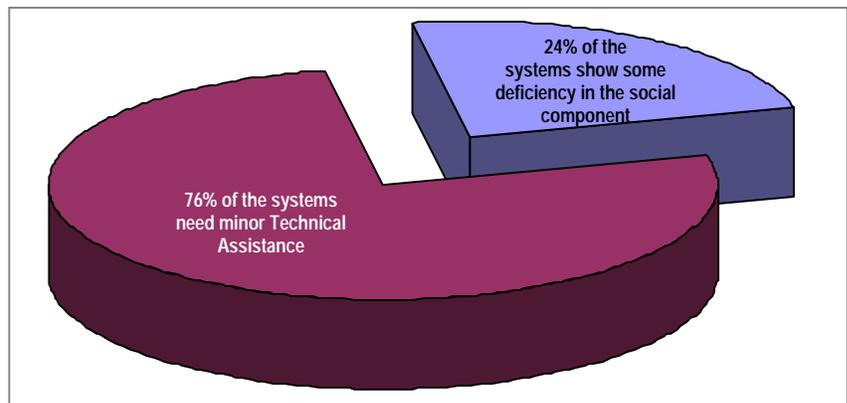
The final data from this graphic shows that while 100% of homes from one community is supplied from other water sources, the homes with children with diarrhea increases up to 70%.

DEMAND FOR TECHNICAL ASSISTANCE

The needs for technical assistance per system are presented in this section of the document. This demand was determined from the findings per indicator and from the analysis of the entire qualitative information that was obtained. The section is divided in three parts with an equal number of components, amply explained in Chapter 6 "Findings". They are the social, administrative or management, and technical component.

7.1 SOCIAL COMPONENT

The demand for technical assistance in the social component has been focused in two general areas: community sanitation and the community's level of management to promote the sustainability of the systems. In the area of community sanitation, there is a need to improve some practices that were rated as deficient. These are not critical factors but if attended, could contribute positively the community's health level. The decisions taken at community level concerning the water systems, through assemblies or other type of civic participation, may restrict their sustainability. Some mechanisms of action are described in Table 14. These could be taken into account in order to overcome certain deficiencies found in the social component. The communities themselves with the support of the Ministry of Health promoters could implement many of these actions. The research of the social component included the participation of women in the managing organization; however, the lack of their involvement in the managing boards has not proved to be a risk factor for the sustainability of the systems. Nonetheless, the managing organizations as well as the community's decision making and management



activities are an excellent opportunity to clarify the social role assigned to women. This aspect is commented in the section Lessons Learned.

There are thirteen (13) systems (24%) that require some type of technical assistance regarding the social component. This does not imply that the remaining systems (76%) meet one hundred percent the standard of quality for their social aspects. It means rather that according to the spirit of the diagnosis, those are the systems that show greater deficiencies, which need to be improved.

Of the 13 systems that appear in the table on next page, 6 of them need greater attention. In order of importance, they are El Tablón, San Ildefonso, El Matazano, Copalchán, Barrio La Alianza and El Cincuyo.

The system in El Tablón was found out of service mainly due to technical complications, which are amply commented in the section “systems with deficiencies in the infrastructure component” in this same chapter, and in the individual report of the chapter on findings. At the moment of editing this document, that system has been repaired with funds from the community. San Ildefonso has very low indicators regarding the practice of hygienic habits and shows some social polarization. Decisions such as lowering the water fees present risks to the financial feasibility of this project, with the possibility of stopping the system due to the eventual repair of the equipment. As it will be seen in the administrative or managerial component, San Ildefonso shows deficits in its savings level. El Matazano and Copalchán present similar situations as San Ildefonso.

The possible mechanisms of action for the rest of the systems are related to hygienic habits. Barrio La Alianza and El Tablón need support for the legalization of its potable water managing organization.

TABLE NO. 14
Systems With Social Deficiencies

COMMUNITIES	LOCATION HOUSES	INSTITUTION	SUPPORTING ACTIVITY
La Puebla	Semi- concentrated	CREA	Develop actions to improve latrine cleaning and disposal of anal cleaning material. Strengthen the managerial abilities of the managing organization in order to promote the access to the system for new users.
Piedras Blancas	Concentrated	CREA	Perform actions to improve water handling and storage, and the disposal of anal cleaning material.
El Sincuyo	Disperse	CREA	Provide support in organizational and communal solidarity aspects (there are problems that may put at risk the entire management of the systems).
El Matazano	Concentrated	PCI	Perform actions to improve the frequency of use of composting latrines and their cleaning.
Rosario Tablón	Between disperse and concentrated	PCI	Perform actions to improve the use of composting latrines and their cleaning.
San Ildefonso	Semi concentrated	PCI	Perform actions to improve children's disposal of faeces, the disposal of anal cleaning material and cleaning of latrines. Strengthen the performance of the managing organization, especially in relation to rate adjustment.
Chilamates, Santa Rita	Semi concentrated	PCI	Strengthen the performance of the managing organization, especially in relation to rate adjustment.
Copalchán	Between disperse and concentrated	PCI	Strengthen the performance of the managing organization, especially in relation to rate adjustment.
Los Amates	Semi concentrated	PCI	Strengthen the performance of the managing organization.
Jalacatal	Semi concentrated	CARE	Perform actions to improve the handling and storage of water, and improving the disposal of anal cleaning material.
El Tablón	Concentrated		Support the legalization of the managing organization. Assist the managing organization in its performance.
Ocotillo	Disperse	CARE	Perform actions to improve the disposal of anal cleaning material.
Barrio La Alianza	Concentrated	CARE	Perform actions to improve children's disposal of faeces, the disposal of anal cleaning material and cleaning of latrines. Support the legalization of the managing organization.

7.2 SYSTEMS WITH DEFICIENCIES IN MANAGEMENT AND FINANCIAL COMPONENTS

The basic indicators for the management component are summarized in the level of savings that the administrations currently present, as well as in the level of service they are providing to users. Comments are made in relation to the assistance they need regarding the type of accounting records and controls they use.

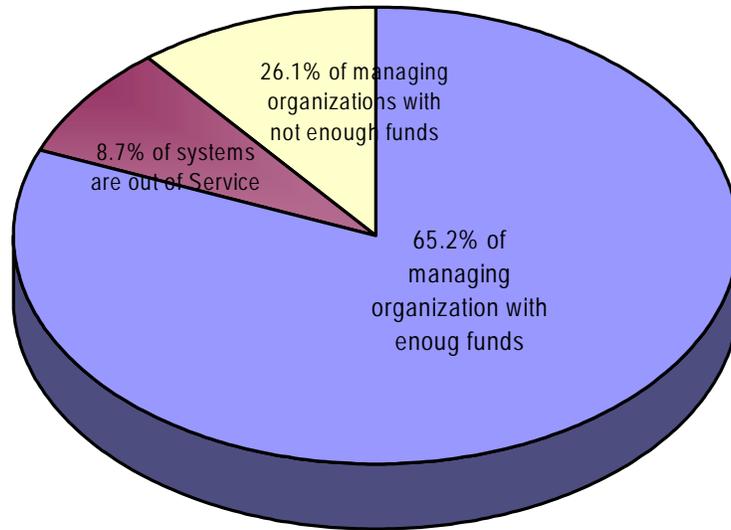
The present savings and their seven years projection were taken as reference to plan the necessary savings that guarantee the sustainability of the water systems. The present cost of the pumping systems and their total depreciation for equal periods of time were considered, as well as the expenses for major maintenance that some communities have performed at the time.

Based on the above, out of the 28 systems with electro-mechanical pumping 21 of them (75%) have adequate levels of savings to pay for expenses generated by major maintenance. This is the result of decisions taken by the communities, such as making new connections,

income from overdue accounts and increase in fees due to increases in electrical costs. Three (3) of the systems (10.7%) have difficulties with their savings, and four (4) of them (14.3%) are out of service. Of the 18 systems operated by gravity, nine (9) of them (50%)

present difficulties with their savings. These are mostly small systems, with weak management, contrary to the remaining nine (9). The chart above shows a percentage distribution of the global situation found in the 46 systems that provide water through pipes. The systems with wells and hand pumps (16.5% of the universe) are not included for not having any type of accounting system.

Demand for Technical Assistance Related to Savings



The communities with enough savings include the systems operated by gravity and some of the managing organizations of the pump systems that show low accounting figures. The latter situation is due to investments made that increase the value of their assets related to the water systems. Example of these investments are the purchase of land and the construction of administrative offices, purchase of plumbing tools, construction of a house for the operator of the system, cleaning of deep well, purchase of pumping equipment with spare parts, etc.

Among the systems with savings but with a low margin for unexpected events, San Antonio Los Ranchos and San Ildefonso call the attention. As it can be observed in Annex 7, these managing organizations have a perspective of deficit, however, they have replacement pumps, which has disturbed their present level of savings.

The managing organizations that have greater problems with their savings are Copalchán, Chilamates -Santa Rita and El Matazano. The three of them have lowered their fees or vary them to the users' convenience. The reasons for the reduction of fees are the lack of payment capacity expressed by users or because the previous rate was "very expensive". Other decisions have also influenced the savings such as: extended periods of grace for defaulting accounts (greater time than the regulation states), unrecovered loans to former directors, among others. In Los Chilamates the defaulting is 51%, and 7% for El Matazano; this is considered high since there are only 50 and 26 users respectively.

Some of the managing organizations with high levels of savings also present high levels of defaulting, for example, La Conquista, Aposentos, Torola and Piedras Blancas. However, these organizations are not affected, either because they have a great number of users, or because they have systems operated by gravity and do not require high levels of savings for major maintenance.

The users seem to be satisfied regarding the type of service that the systems provide, since the level of acceptance for the service and the managing organization are high. The only places where users' perception of the managing organizations is low are San Ildefonso (less than 50%), Zapotitán, Tierra Blanca, and Joateca (between 50 and 60%). In fact, 92% of the households interviewed are satisfied with the quantity of water the systems provide.

No correlation has been found between the data regarding the user's satisfaction with the general service and the rest of the data, such as level of defaulting, number of maintenance people for servicing the systems and the users, etc. There is only one case where there is some correlation. In Zapotitán, users indicate that they are not content with the managing organization, however they are so with the quantity of water they receive. The reasons for their dissatisfaction are related to equity of the service, among other aspects. In contrast, users keep paying their consumption of water to the degree that their level of defaulting is very low, in relation to other systems that are less socially conflictive.

The case of Zapotitán is the same for San Ildefonso, that also has problems with the equity of service, besides having a very deficient personnel management.

Regarding the type of accounting records for the systems, all communities present some deficiencies. Most of them only keep records of income and expenses, with no correlative order. Some do not even have invoices to document their expenses.

The restriction these communities have for not having normal financial statements is acknowledged. However, it is feasible to demand minimum controls such as: filing all invoices for expenses and income, as well as the respective order. Some managing organizations such as those of Zapotitán, El Señor, and Pandeadura have hired an external accountant to be in charge of the accounting area.

TABLE NO. 15
Systems with Deficiencies in the Administrative-Managerial Component

Communities	Institution	Supporting activity
All managing organizations	N/A	Reinforce knowledge about accounts and minimum records required, and provide assistance at least once a year to review records and controls. Provide assistance on the management of their resources and concordance with internal regulations.
Teponahuaste, El Ocotillo, Torola, San Matías, Tierra Blanca and Platanares	CARE	Review causes of administrative deficit that these organizations present.
El Matazano, Chilamates and Copalchán	PCI	Provide guidance on available savings. The managing organization is required to know about the minimum levels of savings needed for a major maintenance.
San Ildefonso	PCI	Provide assistance on personnel management (60% of expenses are on salaries).
Aposentos, La Conquista, Montepeque and Concepción	PCI	Provide technical assistance for the recovery of past due accounts.

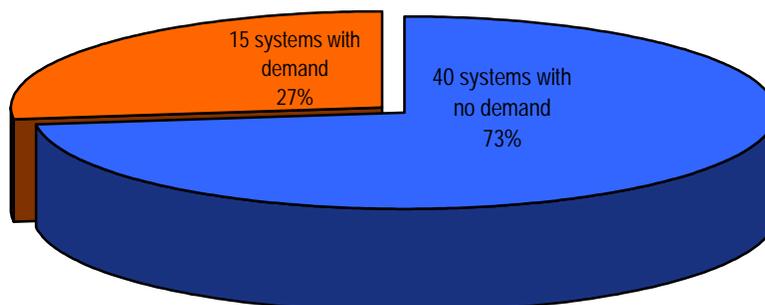
7.3 SYSTEMS WITH DEFICIENCIES IN INFRASTRUCTURE

The technical assistance in the infrastructure component is determined by aspects such as the operation of the systems, the quality of water, the training of the personnel responsible for its management (operators/plumbers) and the supervision of some water and electro-mechanical designs.

Of the fifty-five systems researched, only in five of them the technical construction diagnosis could not be performed. Three of the systems (5%) have incomplete infrastructure; in two of them (4%), no information was obtained because they are managed by ANDA.

The total potable water systems that need technical assistance for the infrastructure component is fifteen (27%). The remaining 40 systems (73%), are operating with no major difficulties and risks.

Findings in the Infrastructure Component



The systems that show a greater need for technical assistance for the infrastructure are five that were found out of service. They are: Canton El Tablón, in the department of La Unión; San Pablo Cañales, Santa Clara, Santa Cruz Porrillo and La Cruzadilla in the department of San Vicente. The first four systems are operated by electro-mechanical pumping and the last one is operated by hand pumps. Another system that requires technical assistance is Canton El Señor in the department of La Libertad. The first four systems require a complete review of their water and electro-mechanical design, revision of pipes in the impellence line and distribution network and of the power of the pumping systems, including an analysis of the water quality in order to determine additional water treatments due to the presence of high level of iron and manganese. These systems will require additional investments in order to operate. The hand pump system requires repairing of the hand pumps. The case of Canton Señor requires checking of water flows for each secondary line and regulation of the gate valve, also a review of the chlorinating system.

The technical assistance requirements for the rest of the systems are related to different aspects. The following table provides a description of the needs of each one of the 14 identified systems.

TABLE NO. 16
Systems with Deficiencies in the Infrastructure Component

Community	Institution	Supporting activities
El Jalacatal, San Miguel	CARE	Analyze the quality of water and asses possible technical solutions.
Canton El Palón, San Miguel	CARE	Deepen the analysis of over pressures that are recorded at some points in the network, and insure that plumbers have the necessary knowledge regarding pressure regulating valves.
Canton San Matías, San Miguel (system by gravity)	CARE	Review system's operational problems and coordinate with the managing organization the implementation of solutions.
Canton El Tablón	CARE	Research entire system, water, electro-mechanical areas, and involve the community in a joint search in order to ensure the system's operations.
Canton Platanares (gravity)	CARE	Strengthen plumbers' ability and provide counseling on water potabilization.
Canton Tierra Blanca, Cacaopera (gravity)	CARE	Perform technical study for each of the system's areas to identify and quantify the necessary actions to improve its operations.
Canton Santa Clara, Department of San Vicente	PCI	Review the system's hydraulic and electro-mechanical designs; review each of the parts built of the same in order to rate and quantify the actions to be performed.
Canton San Pablo Cañales (pumping)	PCI	Review the system's hydraulic and electro-mechanical designs, perform and inventory of parts built in order to rate and quantify the actions to be performed; provide training to plumbers and operators.
Canton El Matazano, San Miguel de Mercedes (pumping)	PCI	Make an inventory of the system's parts and asses with the managing organization the actions to be taken; review the system's water chlorination.
Canton Chilamate, Santa Rita, Chalatenango	PCI	Review the system's hydraulic design and compare it with the production capacity of the current source of supply and the demand. Review chlorinating system and abilities of the system's operators/plumbers.
Canton Concepción	PCI	Review the system's operations and review the system's water potabilization. Coordinate with the managing organization the identification and training of a plumber.
Canton Copalchán, jurisdiction of Tenancingo, Department of Cuscatlán	PCI	Review the hydraulic design, especially the problem of over pressures and physical condition of the distribution network, the ability of the source of supply and review each piece of the current infrastructure.
Colonia Santa Fe, jurisdiction of Tenancingo, Department of Cuscatlán.	PCI	Review the capacity of the current source of supply, study the system's operations and check the quality of water.
Municipality of San Ildefonso, department of San Vicente.	PCI	Review the system's hydraulic and electro-mechanical designs previously to any technical assistance for improving the system's operations. Likewise, the chlorinating systems implemented shall be reviewed.
Canton El Señor, Department of La Libertad.	CREA	Review the system's current operations, especially the present distribution of flow by branch against the design, and review the chlorinating system.

Some systems executed by CREA of El Salvador that have good water service need some type of follow up to optimize some aspects. Canton El Sincuyo, Tacuba, department of Ahuachapán, are not properly chlorinating the water, which provides almost zero concentrations in the distribution network. Even though the service in Canton Santa Rosa, Chalatenango is very good, the water is not being chlorinated because the hypochlorinator is broken. Furthermore, people in charge of the systems during the research asked for guidance, and periodic visits were carried out in order to solve doubts or to be supervised. Some of them even mentioned the need to have the system's documents, including blueprints, memoirs, water analysis, appraisals and costs.

CARE has properly operating systems, and the beneficiaries from these expressed satisfaction with the services. However, the people in charge of the systems Llano Grande, Jalacatal, Los Jobos, mentioned that they need training on how operate, regulate and maintain the pressure regulating valves. In canton Jalacatal, even though the beneficiaries are satisfied with the service, the results of the physical-chemical analysis of the water show non-standard levels of hardness. Regarding iron and manganese, a settler shall be built in the distribution tank in order to retain most of the iron oxide.

PCI has systems that provide service during the entire year, such as Canton Los Amates in San Isidro Labrador, San Antonio Los Ranchos and Canton Conacaste. Their operators express the need to have some type of guidance regarding chlorinating and pipe changes in adduction line in order to avoid some passages through the pile.

In general, all the systems require technical documents so that their managers can improve their performance and decision making. As a result, it is necessary to provide the communities with all the technical files including operation and maintenance handbooks. This material would help them in possible extensions and modifications of the distribution network, for new residential connections or maintenance of pumping equipment.

CONCLUSIONS AND RECOMMENDATIONS

It is encouraging to find strengths that allow the water and sanitation systems built to be sustainable. The high level of management performed by the managing organizations, the level of savings, the culture of payment for the water service, the high level of usage of the sanitary infrastructure, the people's satisfaction for the service received, are examples of some of those strengths. However, it must be kept in mind that the strengths found may be affected by the problems and restrictions detected. The scarce attention given to the preservation of the water quality and quantity, the deficiencies of the chlorinating systems, the technical deficiencies in the design and building of some systems, the deficiencies in accounting record keeping, the interruption of the health committees after the systems were built, among other problems, are elements to be considered in the implementation of new water and sanitation systems.

The learnings resulting from the implementation of different appropriate technologies, from the simplest one to the most complex in the 55 systems researched, leave an open panorama for new interventions to have a multiplying effect of this experience. This research shows that teamwork performed by the community and the executing institution generates a learning process both ways. The permanent involvement of both parties in the different stages developed in each system built, has been a key factor in the findings, and this research was not the exception. The involvement of the different community sectors was indispensable for gathering the field information.

General Conclusions

Among the most important general conclusions the level of local management developed by the communities as consequence of the water project can be highlighted. The achievements and activities geared to accomplish the development of the community after building the systems is noticeable. The communities present better personal and domestic hygienic practices, the levels of community involvement in other issues that affect them has improved, the responsibility taken by the communities to operate, maintain and manage the water and sanitation systems is constantly found. The good use that the communities are making of the sanitary

infrastructure shows that the domestic and community hygienic practices have become important to them. The knowledge of their obligations and rights as users of the systems has produced internal exercises in the communities that test the management and conflict solution ability by the managing organizations. Even though the rural communities do not count with the assistance needed in situations beyond their abilities, they have been able to manage each case and occasionally they have contacted the private sector to solve that type of situations (legal counseling, technical engineering assistance, accounting assistance, etc.).

Regarding the environmental issue, most of the communities are not working to preserve the water research areas of the water sources they use. This is due to the limited or nonexistent educational messages during the implementation of the systems, and consequently, the communities show little or no concern for this issue.

It is important to mention that it is not the purpose of this research to conclude about the effectiveness or best strategies used by the three implementing institutions, since the ideal working conditions for them did not exist. Neither the conditions of time, resources and locations were the same, thus it would be daring to conclude about the findings, and about the best or worst quality of the work performed by each one of them.

General recommendations

In order to insure the sustainability of the rural water and sanitation systems, it is mandatory to incorporate environmental protection activities in future interventions about the recharging of water sources. This would have to be accompanied by an educational component aimed at the beneficiary community, besides the health and social educational components that have already been implemented. In order to protect the present water sources, the possibility of incorporating that component as a complement to the investment already made for the systems built has to be assessed.

Some mechanisms have to be incorporated in the strategies to be developed in the rural water and sanitation projects, to provide a permanent follow up by the managing organizations of the health programs implemented by those projects as well as to insure the sustainability of this component. In the water systems, an enhanced knowledge, design and adaptation of more user friendly chlorinating systems for the rural communities, as well as more

emphasis on education on the importance of consuming potable water.

It is necessary to make efforts in the future to instate coordination and support mechanisms among the communities and their respective local governments, as well as with governmental institutions related to the sector, in order for the communities to seek social, management and technical assistance. It is necessary to provide technical assistance in the accounting area of all managing organizations of the systems researched. At the same time, a technical and social research must be performed in all those systems that were found out of service. This would allow to assess their current conditions and to quantify the resources necessary to make them functional again and to help the communities find the solution to the problem.

Before providing the assistance, it is necessary to set priorities for the indicators in Chapter 7 of this research, which if left unattended, jeopardizes the sustainability of the systems. This demands the assignation of the necessary resources to execute the work plan for those systems identified as priorities.

The following are specific conclusions and recommendations of the research:

Social component

- ✓ Each of the organizational models found show strenghts and weaknesses. It cannot be judged which model is best. As it was observed, the level of commitment gained and the knowledge of its social reason, is more important than the model itself. For instance, there is a model of co-management between the municipality and users community members. There is co-management between the municipality and users community members. A Management Committee of the water system was installed through a municipal resolution. It was found that one of the two participants takes the leadership and displaces the other one. The funds generated by the service that the system provides are deposited in the municipal treasury, generating some confusion if independent records are not kept which insure the availability of the funds, which guarantee the continuity of the water service.

- ✓ Another organizational model found is the specific community association. The municipal council gives these associations legal status and the process ends with the publication of the statutes in the official journal. The operation of this type of management of water systems is interesting because of its specialization. Their specific goal is to manage water and sanitation systems, however, they need to be assisted in areas that are beyond their capacity.
- ✓ A third organizational model found is the community association. The process of becoming legal is the same as that of the specific associations. The main difference found is that their goals are broader and interventions in other aspects of community development are included. A risk in this organizational model is that they may lose sight of the development of the community and may center around a single activity that generates income, in this case the water system. In this type of organizational model, the management activity itself frequently rests on a water committee created under the legal shadow of the community association.
- ✓ The legal framework and the legalization of the managing organizations of the water systems is a key factor for the level of management they are achieving. It is important that the institutions facilitating technical assistance and execution of the systems work together with the communities until they obtain their legal representation. For those cases where the organizational model was not well defined (the co-management municipality-community), one of the parties has taken the leadership, restricting or nullifying the participation of the other party.
- ✓ The community perception of the managing organization may be considered as a positive indicator to be taken in consideration in the process of decentralization of the water systems. The beneficiary communities by the systems researched are an excellent example that decentralization is feasible, and that it is not restricted to decentralization of services but to the local decision making that the communities show are capable of managing.
- ✓ The role of the local governments in most of the rural systems is almost non-existent, not as in those systems that were implemented in the urban areas of the municipalities.

mechanisms allowing and facilitating a greater involvement by local governments in the operation and maintenance of rural systems must be established in future interventions. It was observed that some communities try to maintain their Mayors constantly involved, inviting them to participate in the general assemblies developed in their communities. In other cases the communities transfer monthly to the municipality a percentage of their income as a mechanism for regular supervision of their management activity by the municipality. However, the involvement of the local governments in the management activities performed by the communities for the water systems is limited and depends mostly on the individual profile of the Mayor in office.

- ✓ Female participation in the managing organizations is taking place. Efforts made by the executing institutions in order to change community paradigms have left spaces that may improve the future involvement of women. However, it was observed that the level and quality of the female participation are not as desired, since women generally do not hold important leadership and decision making posts. The male members of the boards express that women can not participate due to the time that management activities require, while the opinion of the people interviewed acknowledges that the role of the women would be important for the management of the systems. It may be stated that this type of comments just conceal their true perception: There is no interest in involving women because this would mean a substantial change in traditional roles of the community life, and the concession of a power space of some prestige in the community. There are several factors that affect this perception, some of them are:
 - Women's self image: They say that managerial work is for men and that they are not prepared;
 - Low acceptance by men of female involvement;
 - Double shifts, at home and at work;
 - Additionally, it was observed that the rise in women schooling is initiating changes. In some communities it was found that women are in charge of managerial work that require a greater level of schooling, which no doubt will influence the perception the communities hold about the ability of women and the changes of attitude necessary to achieve an equal participation within local organization.

One of the strategies of the executing institutions was the incorporation of women during the execution and management of the water and sanitation systems in order to gain their involvement and to contribute to change the culturally assigned roles. However, once the institutions leave, the female role decreases. Women decide to leave the managing organization due to pressure by peers, mates and the rest of the community. This means that seeking female involvement in the managing organization is not enough, educational programs with the goal of changing attitude are needed, as well as the design and execution of values and the fostering of gender knowledge to both men and women. The definition of a policy on gender in the rural water and sanitation programs may contribute positively to this effort.

- ✓ The high level of practice of hygienic habits found is the result of the health education component that the institutions developed within each community. The homes visited are making an adequate disposal of excreta. Most (90%) children over 5 years of age are using the latrines. However, there is still a group of families (20%) that do not dispose adequately the excreta of children under 5 years of age. There was excrement around the latrine or other places around the house.

Regarding the composting latrine, there is a clear tendency to continue its use since a high percentage has emptied the first chamber. Most of the latrine seats were clean, with no visible faeces. However, a high percentage is not depositing the papers within the latrine, which means certain risks with vectors. Despite these findings, the health committees organized during the execution of the systems have suspended the health education messages. A strategy to obtain this continuity must be considered in future interventions.

Administrative or managerial component

- ✓ The savings found in the systems that are being managed by the communities mostly guarantee their sustainability. Several communities have made investments that show the commitment and long term vision they have about the systems provided. Some small systems that operate by gravity show low levels of savings, however the beneficiaries express their disposition to repair them if it were necessary, as long as they count with water at home. Efforts made by the executing institutions to leave dependable management systems in each system built are

constantly found. However, there is evidence that for the small systems the effort was lesser and this somehow shows in the levels of records and savings found.

- ✓ The new residential users found are a sign that the managing organizations are responding to the demand for service by new users. The systems show a tendency of 10% increase in users, even though this rate is greater since the data reported belongs only to the managing organizations that keep control of the new users and of the original homes that use the systems. Some users comment that the connecting costs for new users are high, that is the reason why some poor homes can not have access to the water. Flexible mechanisms must be established in the internal regulations to allow the managing organizations to set payment systems for poor households when installing new connections.
- ✓ All managing organizations are making efforts to keep good accounting and administrative records. However, there are areas that require attention:
 - Several of the managing organizations show problems in registering the donated land.
 - Some managing organizations do not have a service contract or document to prove that users are solvent with their contributions to the Association's equity fund. This has caused some problems at the moment of transferring the rights to residential connections from one user to another.
 - The statutes of some Associations mandate keeping formal accounting records (general ledger, subsidiary ledgers, and financial statements) that are not being implemented.
 - Several managing organizations do not keep registry of assets and real estate, which means that the statutes are not being met.
 - In some managing organizations some directors perform double duties, which cause internal operational problems.
 - External audits in the management of their assets have not been performed in a high percentage of Managing Organizations.
 - Do not keep inventory of their assets, nor have established dates to perform inventory.

All managing organizations need technical assistance aimed at improving administrative and accounting records. It is mandatory to establish the minimum records required for each organization, which matches the amounts of money they manage. Furthermore, it is necessary to study thoroughly the legal requirements that these organizations must meet before other regulatory institutions, such as the Ministry of the Treasury.

Infrastructure component

- ✓ The water chlorinating systems implemented in the researched projects require a better adjustment in each case. The education level regarding the importance of consuming potable water seems to be rather low. People are more interested in the quantity, the physical quality of water and the frequency they receive it, than with the bacteriological quality of it. There is no quality control in well and hand pump systems. What has been gained is to have access to water and to minimize external contamination, but nothing has been done regarding its potabilization. Only 45% of the water systems use chlorine. Bacteriological analysis are performed in 50% of the systems by the Ministry of Health promoters assigned to the area, however, this information does not reach the managing organization and it does not receive counseling for the proper treatment.

- ✓ In several cases, the continuity of the water service for the systems that are working has been affected by external factors. The main one has been the increase of the electric energy. This has caused the communities supplied by pump systems to make the decision of reducing the service hours and, in the best of cases, to increase the fees. The risk involved with this type of decision is the impact on health and on home economics, especially the poorest ones, which could reach the decision to stop receiving the water service. It is mandatory to establish management mechanisms for the communities with electro-mechanical pumps to have access to benefits that the central government has established for this type of situations.

- ✓ The systems that are out of service are mainly so due to problems on the design, combined with social and construction ones. The fact that these systems are out of service has produced low levels of motivation among beneficiaries, not so among community leaders, who continue making efforts in the search of a solution to the problem. These communities do not have the resources needed to put the systems in operation, so there is a need for external aid in order to take advantage of their previous investments.

- ✓ The use of residential flow meters, found in some of the pump systems, has proved to be a good practice since it brings equity to the water service, helps to minimize its waste and to preserve a limited natural resource. There have been social problems in the systems that have not installed flow meters, caused by an unfair use of the water resource, by an equal monthly rate, generating several internal problems in the communities. These problems are felt specially during the dry season, when the water is scarce and at the same time the demand is greater. The use of residential flow meters must be a practice adopted not only by the systems using pumps, but also by the systems using gravity. This would allow for a more rational use of the water, and for a fair system of monthly payments for the service received by each home.

- ✓ The leaks found in some of the distribution networks are recurrent, even from the beginning when the institutions built the systems. The leaks have reached the point of causing the suspension of the service for long periods of time in three cases, ranging from three to twenty-one days each. These situations are not the standard. The systems that passed the watertight tests during their construction do not present this type of problems. The keys to minimizing these problems are the quality of the materials, the technical supervision, the watertight tests and the compliance of construction standards during the construction of the systems.

- ✓ There is a general lack of technical information in the hands of the communities. Approximately 90% of the managing organizations do not have the technical information that would allow them to make important decisions about the operation and maintenance of the systems. Directors as well as operators and plumbers mentioned the need to have all pertinent information about the systems. They also need to have the pumping systems operations and maintenance handbooks, with simple illustrations for making local repairs. It is necessary to provide the managing organizations with all technical information on system operation and maintenance in order for them to make better decisions on that regard. They can not be held accountable for good management if they have not been properly documented and informed.
- ✓ Local operation and maintenance personnel were found in almost all of the systems. Most of them had been trained during the implementation of the systems. The personnel keeps learning every day since the systems have particular difficulties, and due to this daily work, most users express their satisfaction about the service they receive. The level of experience gained by the operators and plumbers is important for the life of the systems. Hence their training during the execution of the systems is a key factor, by means of the method of learning by practice.
- ✓ The sanitation infrastructure built is being used by a high percentage (94%) of homes in the communities visited. The research found that the families are satisfied with the type of latrines built. Furthermore, the building components (walls, roofs, and devices) were in good conditions even after years of use. The findings confirm that the educational factor is determinant. It is mandatory to foster this practice during the execution of the projects in an integral, participative fashion by the same technical team and as an inherent part of the water intervention, in order to maximize the results.
- ✓ The residential wells improved with rope and Mayan pumps are operating well in the three communities visited. The wells are sealed with a concrete slab and a good percentage of families have built roofs for them. Furthermore, the people are satisfied with the quantity of water produced by the wells. The main problem found is the absence of water

treatment, which undoubtedly influences the occurrence of gastrointestinal diseases.

- ✓ A good percentage of community wells operating with hand pumps are working. The executing institutions trained community representatives on repairs and maintenance, but the lack of the proper tools causes the wells that need repairing to end up out of service. The lack of a directing board or committee in charge of the management of these small systems is notorious. Facing this situation, some people take the initiative and start collecting funds in order to make the repairs that do not surpass the technical ability of the members of the communities that had the training. The water supplied through this type of system is consumed without any kind of treatment. Future interventions with these last two types of systems shall be complemented with a strong educational component aimed at chlorinating the water and to facilitate the access to the necessary technology.

LESSONS LEARNED

Two strengths were found which indicate that the road to local rural water and sanitation systems' sustainability has been opened. Most weaknesses and restrictions are easily overcome if the communities receive specific technical assistance for it; except for the systems found out of service which require greater analysis. The basic sanitation and social components show positive results, according to the research findings.

Given the variety of technologies implemented, their magnitude, and scarce experience in the rural sector to manage them, the water systems require greater attention, compared to the other aspects mentioned before. However, the experience has been rated as successful and it can be said that with these USAID interventions, there is in El Salvador an example of decentralization of water systems and that spaces have been opened to drive sustainable interventions in the rural water and sanitation sector.

Among the most relevant lessons learned are:

- The level found in the use of the sanitary infrastructure shows that whatever the type of technology implemented is well used by the communities, as long as a conscious participation by the community is reached during the implementation stage of the infrastructure, simultaneously complemented with the corresponding educational component. Even though the strategy implemented for the educational component was different from that of the executing institutions, the results found are similar.
- Even though management limitations were found, the level of savings by the communities show that the systems are financially sustainable; as long as an adequate fee structure exists according to the particular characteristics of each system.
- The residential hand pumps (rope and Mayan) installed in homes have resulted in a better accepted solution by users and are easier to maintain, compared to the communal ones (MARK II) that were installed. Both solutions require greater education and a technical complement for the potabilization of water.

- For the definition of the organizational model for managing, operating and maintaining of the water and sanitation systems, it is important for the community to trust and identify with this model. The role of the executing institutions is to strengthen and to train said organizations, to develop with them the statutes and regulations as well as to guide them about their reach.
- The co-managed model (Municipality - Community) has not been the most efficient regarding fairness when sharing responsibilities. As it has been mentioned before, this model has to be studied further more if it is going to continue to be implemented.
- The installation of flow meters in residential connections has helped to make the water supply more just and even-handed. The systems that did not install this accessory still present internal and social problems of fairness among the low and high lands communities. Up to this date, only some of the systems that use pumps have installed the flow meters as a means to preserve the water resource and at the same time to minimize the problems stated above. This practice of installing water flow meters shall be extended to the systems that work by gravity.
- When the electro-mechanical systems used to chlorinate water that use pumps fail to work, they represent an obstacle for the managing organizations. Likewise, the traditional systems used in the systems that operate by gravity have not been very functional. The bacteriological treatment of water demands more thought and research.
- The strategy of forming health committees to facilitate the education of the health component during the physical execution of the systems does not show any follow up once the executing institution leaves the community. Not one committee was found, during the field research, of those formed during the process of execution of the systems. The health messages the communities receive are limited to the ones presented by the Ministry of Health promoter. It would be worth to review the strategies used to this date and to make the necessary adjustments. Trained local staff may join efforts with locals in order to help the health improvements reached through the water and sanitation systems become sustainable.
- The absence of the environmental component, as an integral part of the water systems, is responsible for the lack of actions by the communities regarding the micro-basins that supply the water. Likewise, the statutes and regulations that give life to the managing organization do not include obligations that guarantee the sustainability of the water resource.

- The level of coordination between the communities and the respective local governments is limited. There is a better relationship when the systems have been implemented in the urban areas of the municipalities, especially in those where they are part of the managing model. The little acknowledgement and support that the local governments are providing to the present system managing organizations is noticeable. This situation could be due to their limited involvement during the implementation process or the limited technical resources these local governments have in order to support the communities.
- Despite the efforts the three executing institutions make to improve the involvement of women in the managing organizations, the results show that a gender approach to the implementation strategy would facilitate greater spaces for the participation of women in the medium term. It is necessary to promote even more their viability and to optimize the role that rural women may play within the communities. Cultural patterns are acknowledged as being a strong barrier for obtaining better results, but it is foreseeable that the spaces gained through the water systems provide better opportunities for women.
- The results of this research show two important aspects: a) the communities show local capacity to operate, manage and maintain the water systems, as long as they are an integral part of the whole process and count with enough support to ensure the sustainability; and b) that despite the ability developed by the rural communities, it is evident that there are situations that are beyond this ability. The lack of a permanent local or centralized institution to provide assistance, jeopardizes the efforts developed in search of these interventions' sustainability.
- The lack of a basic line previous to the implementation of the researched systems has not allowed the comparison of the findings or to observe the progress made by the built systems. This research invites other studies to research more on aspects such as the economic and social impacts among others, produced by the water and sanitation systems in rural beneficiary communities.
- The level of management developed by the community leaders, as a value added from the water and sanitation interventions, is noticeable. Many communities have gained on their own doing, great recognition and support from other cooperating agencies in order to invest in their water systems or to solve other community problems they face. All this is the result of their ability developed during the execution of water systems and through their management.

- The implementation of computerized record and billing systems has proved to be a good experience. This can be said because of the orderly records and by the positive image that the users have about the pay slips they receive for monthly payment.
- The associative work requires not only sharing resources, but also sharing risks. This situation was not faced by the systems managed under this model, which mostly ended up with functional deficiencies or were out of service.

ANNEX

ANNEX 1. FINDINGS IN INDICATORS FROM 36 SYSTEMS MANAGED BY COMMUNITIES

COMMUNITY / EXECUTOR	Water System Type	Inauguration date	IMPACT INDICATORS										EFFECT INDICATORS										Provision of technical file	
			HEALTH COMPONENT					HEALTH EDUCATION COMPONENT					SOCIAL COMPONENT											
			% homes reporting cases of diarrhoea on day of visit	% homes reporting cases of diarrhoea in last 15 days	% Homes reporting deaths due to diarrhoea during last 5 years	% mortality due to diarrhoea in 1998	# of <5 years old dead due to diarrhoea by year					% at no risk of water contamination due to handling and storage	% of dwellings with no superficial faeces	% of clean latrines	% of latrines used	% >5 year olds using latrines	Satisfaction with service	Participation of women in management			Managing organizations with legal representation	% users rating between good and excellent the work of the managing organization		
							1994	1995	1996	1997	1998							# men	# women	%				
CREA																								
La Puebla, San Matías	Pumps	Oct-94	20	20	0	0	0	0	0	0	0	70	100	55.6	90	98.2	100	5	2	40	90	Yes	60	no
El Señor, Quezaltepeque	Pumps	Mar-94	0	4.3	0	0	0	0	0	0	0	54.2	82.8	60.9	95.8	91.7	83	5	1	20	91.6	Yes	62.5	no
Zapotitán, Ciudad Arce	Pumps	Aug-94	12.1	39.4	0	0	0	0	0	0	0	51.5	72.7	72.7	100	93.7	90.9	4	0	0	97	Yes	57.6	no
Aticoayo, San Pablo Tacachico	Pumps	Dec-94	23.8	34.1	1.2	1	1	0	0	0	0	70.5	75.6	57.5	86	86.2	86.6	8	2	25	76	Yes	69.7	no
Pandeadura, Tacuba	Gravity	Dec-95	10.3	10.9	0.5	1	0	0	0	0	1	57.4	66.3	65.5	97.9	98	100	7	0	0	60	Yes	69.4	no
yesncuyo, Tacuba	Gravity	Jan-96	17.9	28.2	1.3	0	0	0	1	0	0	73.4	83.5	84.8	100	100	98.7	9	0	0	78.2	Yes	78.2	no
Sta.Rosa, Nva. Concepción	Pumps	Jan-96	13.3	40	0	0	0	0	0	0	0	46.7	46.7	80	100	78	100	10	0	0	73.3	Yes	100	no
Piedras Blancas, Pasaquina	Pumps	Sep-95	15.8	26.3	0	0	0	0	0	0	0	52.6	83.3	100	89.5	88.4	84.2	9	0	0	89.5	Yes	89.5	no
Total	8 Systems		14 average	25 average	0.4 average	0.3 average	1	0	1	0	1	60 average	76 average	72 average	95 average	92 average	93 average 94 median (minimum 83 maximum 100)	57	5	14	82 average	8 legally	73 average	8 lacking
PCI																								
Los Amates, San Iyedro Labrador	Gravity	Jun-96	10	50	0	0	0	0	0	0	0	70	75	33.3	90	74.14	100	4	2	50	90	Yes	90	no
San Antonio Los Ranchos	Pumps	Nov-96	24	56	0	0	0	0	0	0	0	100	95.5	77.3	88	82	96	5	1	20	68	No	72	no
El Matazano Sn Miguel	Pumps	Jul-96	12.5	50	0	0	0	0	0	0	0	75	100	50	100	72.22	87.5	4	2	50	100	Yes	87.5	no
Conacaste, Concepción	Gravity	Aug-96	15	55	5.56	0	1	0	0	0	0	85%	73.3	53.3	75	100	100	6	0	0	90	Yes	90	no
Chilamates, Santa Rita	Pumps	Apr-94	22.2	70	0	0	0	0	0	0	0	50	90	70	100	100	100	4	1	25	100	Yes	80	no
Aposentos, Tejutla	Gravity	Sep-96	10	60	0	0	0	0	0	0	0	70	80	90	100	76.7	100	4	0	0	90	Yes	70	no
Concepción, Tejutla	Gravity	Jul-96	60	50	0	0	0	0	0	0	0	70	70	50	100	89.2	50	6	0	0	85	Yes	80	no
Santiago Nonualco	Pumps	Mar-97	4	9.8	1	0	1	0	0	0	0	90.2	74.5	62.7	98	98	100	6	4	67	90.2	Yes	70.6	yes
Copalchán, Tenancingo	Pumps	Dec-94	0	25	0	0	0	0	0	0	0	50	91.7	66.7	100	91.3	100	5	1	20	91.7	Yes	91.7	no
Corral Viejo, Tenancingo	Pumps	Nov-96	22.2	33.3	0	0	0	0	0	0	0	55.6	76.5	76.5	94.4	82.9	100	5	0	0	77.8	Yes	83.3	no
Rosario Tablón, Tenancingo	Pumps	Mar-91	20	30	0	0	0	0	0	0	0	80	100	70	100	93.4	100	5	2	40	100	Yes	90	no
La Conquista, Suchitoto	Gravity	Aug-97	0	30	0	0	0	0	0	0	0	10	100	77.8	90	84.6	100	5	1	20	100	Yes	70	no
Montepeque, Suchitoto	Gravity	95	20	60	0	0	0	0	0	0	0	60	87.5	62.5	80	100	80	5	0	0	100	Yes	70	no
San Ildefonso	Pumps	Mar-97	9.5	19	0	0	0	0	0	0	0	61.9	53.3	33.3	71.4	69.5	57.1	5	0	0	97.6	Yes	45.2	yes
Total	14 Systems		16 average	43 average	0.5 average	0	2	0	0	0	0	60 average	83 average	62 average	92 average	87 average	91 average 100 median (minimum 57, maximum 100)	69	14	16	91	13 legally 1 no	78 average	12 lacking 2 yes
CARE																								
El Palón, Lolotique	Pumps	Sep-96	11.1	24.3	2.5	0	2	0	0	0	0	43.2	87.7	74.1	98.8	99.5	87.7	5	0	0	81.5	No	69.1	no
San Matías, Ciudad Barrios	Gravity	Jul-96	16.7	16.7	0	0	0	0	0	0	0	91.7	100	83.3	100	98	100	10	0	0	83.3	Yes	91.7	no
Teponahuaste, Ciudad Barrios	Gravity	Jul-97	20	30	0	0	0	0	0	0	0	60%	80%	70%	90%	90.1	100%	4	1	25	90	Yes	80	no
El Jalacatal, San Miguel	Pumps	Jan-98	10.9	31.7	0	0	0	0	0	0	0	52.3	76.9	73.8	100	99	98.5	7	1	14	87.5	Yes	79.7	no
Tierra Blanca, Cacaopera	Gravity	Mar-98	22.2	33.3	0	0	0	0	0	0	0	55.6	44.4	66.7	100	88.1	22.2	3	0	0	88.9	No	55.6	no
Torola	Gravity	Mar-97	0	20	0	0	0	0	0	0	0	50	80	80	100	100	100	7	2	29	90	Yes	90	no
Ocotillo, San Fernando	Gravity	Aug-97	11.1	11.1	0	0	0	0	0	0	0	100	100	100	100	100	100	6	3	50	100	Yes	66.7	no
Platanares, San Fernando	Gravity	Jan-97	0	50	0	0	0	0	0	0	0	25	100	100	100	100	100	3	2	67	100	Yes	100	no
Barrio La Alianza, Corinto	Gravity	Sep-97	0	10	0	0	0	0	0	0	0	70	40	50	100	94.7	70	7	2	29	100	NO	80	no
San Francisquito, Yamabal	Gravity	Sep-97	10.5	16.7	0	0	0	0	0	0	0	78.9	92.9	93.3	73.7	55.6	84.2	8	1	13	79	Yes	73.7	no
El Nanzal, Santa Elena	Pumps	Aug-97	5.4	25	0	0	0	0	0	0	0	33.7	88	64.1	97.8	95.9	100	10	1	10	75	No	85.9	no
Los Amates, Santa Elena	Pumps	Sep-97	5	20	0	0	0	0	0	0	0	40	87.2	79.5	95	96.6	97.5	12	3	25	72.5	No	72.5	no
Llano Grande, Jucuapa	Pumps	Nov-97	3.3	5.6	1.9	1	0	0	0	0	1	52.9	72	76	98	99.6	100	10	0	0	64.8	Yes	90.7	no
Hato Nuevo, San Alejo	Pumps	Feb-96	13	26.1	0	0	0	0	0	0	0	91.3	60.9	73.7	100	98.2	100	6	4	67	91.3	Yes	73.9	no
Total	14 Systems		9 Average	22	0.3	0.07	2	0	0	0	1	56 average	74 average	73 average	90 average	94 average	90 average, 99 median (minimum 22, maximum 100)	98	20	16	86	9 legally, 6 in process	79	14 lacking
Total or General Average	36 Systems		13 average	31	0.3	0.08	5	0	1	0	2	58 average	80	68	94	90	100 median	224	39	14	87 average	30 legally 6 in process	77 average	34 lacking 2 have them

ANNEX 1. FINDINGS IN INDICATORS FROM 36 SYSTEMS MANAGED BY COMMUNITIES

EFFECT INDICATORS																										
ADMINISTRATIVE - FINANCIAL COMPONENT																										
COMMUNITY / EXECUTOR	Existence of management regulations	Initial rate for water service ¢	Present rate for water service ¢	Income ¢	Expense s ¢	Savings at moment of evaluation ¢	Behavior of payments			Has operator 1 yes 2 no	Percentage of days a week receiving water						Observations	Hours a day						residual chlorine 1 yes, 2 no		
							# Users	# Defaulting	%		1 to 2 d/w	3 d/w	4 d/w	5 d/w	6 d/w	7 d/w		1 to 2 hours	3 to 4 hours	5 to 6 hours	7 to 8 hours	9 to 10 hours	11 to 12 hours		13 to 24 hours	
CREA																										
La Puebla, San Matías	Yes	45	45	3385	2457	38,843.47	69	12	17	1	0	0	0	0	0	100		0	10	0	0	30	30	30	2	
El Señor, Quezaltepeque	Yes	45	63	8,590	6,235	43,373.00	134	19	14	1	0	0	0	0	0	91.7		12.5	32.5	54	0	0	0	0	1	
Zapotitán, Ciudad Arce	Yes	25	25	11,642	12,007	16,962.70	344	46	13	1								0	0	9.1	84.9	3	3	0	1	
Atiocoayo, San Pablo Tacachico	Yes	23	30	10,371	9,252	112,270	372	80	22	1						95.5		0	0	0	0	15.9	0	61.1	1	
Pandeadura, Tacuba	Yes	12	15	15,134	10,595	158,320.82	936	64	7	1	0	0	0	0	0	95.7		0	0	0	0	0	0	93.68	1	
yesncuyo, Tacuba	Yes	10	15	16,020	20,667	32,076.53	899	308	34	1	0			1.3		98.7		0	0	0	0	0	0	100	2	
Sta.Rosa, Nva. Concepción	Yes	30	40	5,454	4838	60,671.01	151	17	11	1	0	0	0	0	0	100		0	0	0	0	0	0	100	2	
Piedras Blancas, Pasaquina	Yes	30	30	3460	1,595	63,000	136	35	26	1	0	0	100	0	0		4 d/w, 13 to 24 h/d	0	0	0	0	0	0	100	1	
Total	8 have them	3 same	5 increased	74056	67,646	525,518	3041	581	19	8 sí	-	-	-	-	-	85 average 96 Median		-	-	-	-	-	-	-	5 yes 3 no	
PCI																										
Los Amates, San Iyedro Labrador	Yes	8	3	135	0	1,500	45	0	0	2	0					100		0	0	0	0	0	0	100	2	
San Antonio Los Ranchos	Yes	7	16.95	3,770	3,432	7,236.21	266	0	0	1	0					100			40	0	0	0	0	96	2	
El Matazano Sn Miguel	Yes	35	27	794	622	3,657.37	26	2	8	1						100	1 to 2 hours	100	0	0	0	0	0	0	2	
Conacaste, Concepción	Yes	6	6	1084	600	16,559.90	238	28	12	1						100		0	0	0	0	0	0	100	1	
Chilamates, Santa Rita	Yes	30	25	0	0	1,160.78	50	4	8	1	10		90			0	4 d/w, 1 to 4 h/d	50	40	0	0	0	0	10	2	
Aposentos, Tejutla	Yes	5	5	133	0	3,257	39	20	51	2						100		0	0	0	0	0	0	100	1	
Concepción, Tejutla	Yes	8	8	0	0	0	95	76	80	2		30	20			50		50	0	0	0	0	0	50	2	
Santiago Nonualco	Yes	12	12	5,238	3,995	44,929.75	568	50	9	1	0	0	0	0	0	100		0	0	0	0	0	0	100	1	
Copalchán, Tenancingo	Yes	25	18	2,729	2,496	16,225	113	12	11	1	0	25	75	0	0	0	3 to 4 d/w, 1 to 4 h/d	8.3	83.3	8.3	0	0	0	0	2	
Corral Viejo, Tenancingo	Yes	20	20	5,291	5,622	60,251.42	130	50	38	1	0	0	0	5.6	0	94.4		0	0	0	5.6	5.6	0	88.9	1	
Rosario Tablón, Tenancingo	Yes	21	24	2,952	2,476	7,219.38	116	2	2	1	0	0	0	0	0	100		0	0	0	0	0	0	100	1	
La Conquista, Suchitoto	Yes	5	5	78	38	5,252.44	36	25	69	1	0	0	0	0	0	100		0	0	0	0	0	0	100	2	
Montepeque, Suchitoto	Yes	10	10	1000	838	0	148	48	32	1	0	0	0	0	0	100		10	0	10	0	0	0	80	1	
San Ildefonso	Yes	48	65.5	26,756	24,680	5,240.72	464	90	19	1	7.2	38.1	31	2.4	0	21.4		50	16.7	7.3	4.2	2.4	9.6	0	1	
Total	14 have them	7 same	4 decrease	49,960	44,799	172,489.90	2334	407	17	11 yes 3 no	-	-	-	-	-	76 average 100 median		-	-	-	-	-	-	-	7 yes 7 no	
CARE																										
El Palón, Lolotique	Yes	41	46	36,867	30,202	121,207.98	772	129	17	1	2.5	2.5	7.4	1.2	2.5	82.7		9.8	17.2	22.2	16	6.2	7.4	2.9	1	
San Matías, Ciudad Barrios	Yes	5	5	0	0	0	120	120	100	1	0	8.3	0	0	0	91.7		0	8.3	0	0	0	0	0	91.7	1
Teponahuaste, Ciudad Barrios	Yes	10	10	397	320	920	47	7	15	1	0	0	0	0	0	100		0	0	0	0	0	0	100	1	
El Jalacatal, San Miguel	Yes	45	45	26,478	24,931	51,859.79	460	60	13	1	0	0	0	0	4.7	95.3		12.5	0	1.6	3.2	1.6	3.6	78.1	1	
Tierra Blanca, Cacaopera	Yes	5	10	0	0	0	49	32	65	1	0	66.7	33.3	0	0	0	3 to 4 d/w, 1 to 2 h/d	100	0	0	0	0	0	0	0	2
Torola	No	10	10	412.5	150.75	0	39	19	49	1	0	0	0	0	0	100		0	0	0	0	0	0	100	2	
Ocotillo, San Fernando	yes	7	8	160	140	200	20	3	15	1	0	0	0	0	0	100		0	0	0	0	0	0	100	2	
Platanares, San Fernando	yes	10	0	0	0	0	5	5	100	2	0	0	0	0	0	100		0	0	0	0	0	0	100	2	
Barrio La Alianza, Corinto	yes	10	10	770	865	3,644	80	5	6	1	0	0	0	0	0	100	1 to 2 hours	100	0	0	0	0	0	0	1	
San Francisquito, Yamabal	Yes	15	15	2,645	1,797	18,255.15	182	6	3	1	0	0	0	0	0	100		0	0	0	0	0	0	100	2	
El Nanzal, Santa Elena	Yes	41	55	46,032	30,160	172,940.28	698	80	11	1	0	7.6	1.1	8.7	50	32.6		1.1	0	2.2	0	0	0	96.7	1	
Los Amates, Santa Elena	Yes	50	50	14,472	10,199	27,811.24	243	20	8	1	0	2.6	0	0	0	97.4		0	0	0	2.6	0	0	97.4	1	
Llano Grande, Jucuapa	Yes	50	50	32,440	28,677	51,405.75	454	60	13	1	0	0	0	0	0	100		0	0	0	0	0	9.3	90.7	1	
Hato Nuevo, San Alejo	Yes	30	30	11,135	7,524	61,942.25	228	30	13	1	0	0	0	0	4.3	95.7		0	0	0	0	0	0	100	2	
Total	13 yes, 1 no	9 same	4 increase	171,809	134,966	510,186.44	3397	576	17	13 yes 1 no	-	-	-	-	-	85 average, 99 median		-	-	-	-	-	-	-	8 yes 6 no	
Total or General Average	35 have them 1 lacking	19 same	12 increase	295,825	247,411	1,208,193.87	8772	1564	18	32 yes 3 no	-	-	-	-	-	82 average, 82 median		-	-	-	-	-	-	-	20 yes 16 no	

ANNEX 1. FINDINGS IN INDICATORS FROM 36 SYSTEMS MANAGED BY COMMUNITIES

EFFECT INDICATORS											
COMMUNITY / EXECUTOR	ADMINISTRATIVE - FINANCIAL COMPONENT							TECNICAL - CONSTRUCTION COMPONENT			
	% homes with less water during summer	% homes with less water during summer, not enough for basic chores	% homes with less water during summer, enough for basic chores or are not affected	% homes using other sources	Homes supplied presently	Homes connected by managing organization	Homes supplied initially	% of increase *	% leaks in taps	Leaks in distribution network	% of latrines in good physical condition
CREA											
La Puebla, San Matías	66.7	33.3	66.6	10	69	0	69	0	0	yes	100
El Señor, Quezaltepeque	20.8	40	60	0	134	0	134	0	8.3	no	84.7
Zapotitán, Ciudad Arce	78.8	33.3	50	3	344	80	264	30	3	no	96
Atiocoayo, San Pablo Tacachico	76.7	30.3	69.7	12.2	372	87	285	31	4.8	no	87.7
Pandeadura, Tacuba	58.3	27.3	63.7	7.4	936	74	862	9	3.2	no	97.5
yesncuyo, Tacuba	35.9	3.6	96.4	1.3	899	249	650	38	0	no	96.6
Sta.Rosa, Nva. Concepción	20	0	100	6.7	151	11	140	8	13.3	no	95.5
Piedras Blancas, Pasaquina	100	94.7	5.3	100	136	11	125	9	0	no	96.5
Total	57 average 62 Median	33 average 31 median	64 average 65 median	18 average 7 Median	3041	512	2529	20	4 average		94 average
PCI											
Los Amates, San Iyesdro Labrador	20	0	100	10	45	0	45	0	0	no	93.3
San Antonio Los Ranchos	36	11.1	88.9	4	266	48	218	22	0	no	90.6
El Matazano Sn Miguel	100	37.5	62.5	37.5	26	2	24	8	12.5	yes	100
Conacaste, Concepción	55	9	90.9	10	238	79	159	50	0	no	90
Chilamates, Santa Rita	100	100	0	100	50	0	50	0	0	yes	90
Aposentos, Tejutla	100	77.8	22.2	70	39	2	37	5	0	yes	86.6
Concepción, Tejutla	90	100	0	100	95	8	87	9	10	yes	93.3
Santiago Nonualco	70.6	2.6	97.4	0	568	22	546	4	7.8	no	79.7
Copalchán, Tenancingo	33.3	25	75	8.3	113	21	92	23	0	no	86.1
Corral Viejo, Tenancingo	5.6	0	100	5.6	130	28	102	27	0	yes	87
Rosario Tablón, Tenancingo	10	0	100	0	116	3	113	3	0	no	93.3
La Conquista, Suchitoto	100	90	10	90	36	6	30	20	0	no	93.3
Montepeque, Suchitoto	100	60	40	90	148	0	148	0	0	no	86.6
San Ildefonso	24	79.2	20.8	66.7	464	0	464	0	7.1	yes	82.2
Total	60 average 62 Median	42 average, 31 median	58 average 69 median	42 average 24 median	2334	219	2115	10	3		89 average
CARE											
El Palón, Lolotique	53.1	40.9	59.1	36	772	0	772	0	12.5	yes	88.4
San Matías, Ciudad Barrios	100	41.7	58.7	91.7	120	0	120	0	25	yes	100
Teponahuaste, Ciudad Barrios	90	44.4	55.5	40	47	0	47	0	30%	no	87
El Jalacatal, San Miguel	25	18.8	81.3	26.6	460	0	460	0	15.4	yes	90.2
Tierra Blanca, Cacaopera	88.9	88.9	11.1	77.8	49	0	49	0	0	yes	100
Torola	60	0	100	10	39	0	39	0	10	no	93.3
Ocotillo, San Fernando	44.4	66.7	33.3	11.1	20	0	20	0	0	no	92.6
Platanares, San Fernando	100	100	0	100	5	0	5	0	0	no	100
Barrio La Alianza, Corinto	80	50	50	20	80	0	80	0	0	no	90
San Francisquito, Yamabal	52.6	18.2	81.9	15.8	182	23	159	14	0	no	91.2
El Nanzal, Santa Elena	22.8	38.1	61.9	19.6	698	0	698	0	7.7	yes	83.3
Los Amates, Santa Elena	31.5	7.1	85.7	15	243	0	243	0	5	no	81.7
Llano Grande, Jucuapa	18.5	40	40	14.8	454	0	454	0	5.9	no	83
Hato Nuevo, San Alejo	4.3	0	100	26.1	228	5	223	2	4.3	no	94.2
Total	55 average 53 median	40 average 40 median	58 average 59 median	36 average 23 median	3397	28	3369	0.8	8 average		91 average
Total or General Average	58 average 57 median	39 average 39 median	59 average 61 median	34 average 15 median	8772	759	8013	9	5		91

ANNEX 2. FINDINGS ON SYSTEM INDICATORS NOT EXCLUSIVELY MANAGED BY THE COMMUNITY

COMMUNITY	MANAGEMENT	EXECUTOR	TYPE OF SYSTEM	INAUGURATION DATE	IMPACT INDICATORS										EFFECT INDICATORS											
					HEALTH COMPONENT										HEALTH COMPONENT					SOCIAL COMPONENT						
					% homes reporting cases of diarrhoea on day of visit	% homes reporting cases of diarrhoea in last 15 days	% Homes reporting deaths due to diarrhoea during last 5 years	% mortality due to diarrhoea in 1998	# of <5 year olds dead due to diarrhoea by year					% at no risk of water contamination due to handling and storage	% of dwellings with no superficial faeces	% of clean latrines	% of latrines used	% >5 year olds using latrines	Satisfaction with service	Participation of women in management				Managing organizations with legal representation	% users rating between good and excellent the work of the managing organization	Provision of technical file
									1994	1995	1996	1997	1998							# men	# women	%	% users approve of women participating in management body			
Arambala	Municipality	CARE	gravity	May-97	10	0	0	0	0	0	0	0	0	80	60	10	100	100	100	n/a	n/a	-	n/a	1	90	2
Joateca	Municipality-community	CARE	gravity	Apr-97	14.3	14.3	0	0	0	0	0	0	0	85.7	92.9	78.6	100	95	71.4	6	0	0	92.9	1	78.6	3
Perquin	Municipality-community	CARE	pumps	Aug-97	9.1	18.2	0	0	0	0	0	0	0	75	66.7	58.3	100	100	100	9	1	11	90.9	1	63.6	3
Ereguayquin	Municipality-community	CARE	pumps	May-95	8.6	22.9	0	0	0	0	0	0	0	91.7	72.2	27.8	100	99.3	100	5	2	40	82.9	1	85.7	1
Villa El Triunfo	ANDA	CARE	pumps	94	11.4	28.6	0	0	0	0	0	0	0	84	79	37	100	97.7	100	n/a	n/a	-	n/a	1	n/a	n/a
Nueva Granada	ANDA	CARE	pumps	95	9.6	26.4	0	0	0	0	0	0	0	73.1	63.5	32.7	98.1	99.2	94.3	n/a	n/a	n/a	n/a	1	n/a	n/a
Total or General Average					10.5	18.4	0	0	0	0	0	0	0	82	72	35 median	100	99	94.28	20	3	13	89	6 legally	79	1 same 3 no 2 n/a

ANNEX 2. FINDINGS ON SYSTEM INDICATORS NOT EXCLUSIVELY MANAGED BY THE COMMUNITY

COMMUNITY	EFFECT INDICATORS																																					
	ADMINISTRATIVE - FINANCIAL COMPONENT																							ECNICAL - CONSTRUCTION COMPONENT														
	Existence of management regulations	Initial rate for water service ¢	Current rate for water service ¢	Income ¢	expenses ¢	Savings at moment of evaluation ¢	Behavior of payments			Has operator 1 yes 2 no	Percentage of days a week receiving water							Hours a day							residual chlorine 1 yes, 2 no	% homes with less water during summer	% homes with less water during summer, not enough for basic chores	% homes with less water during summer, enough for basic chores or are not affected	% homes that use other sources	Homes supplied presently	Homes connected by managing organization	Homes supplied initially	% of increase	% leaks on taps	Leaks in distribution network	% of latrines in good physical condition		
							# Users	# Defaulting	%		1 to 2 d/w	3 d/w	4 d/w	5 d/w	6 d/w	7 d/w	Observations	1 a 2 horas	3 to 4 hours	5 to 6 hours	7 to 8 hours	9 to 10 hours	11 to 12 hours	13 to 24 hours														
Arambala	1	10.5	10.5	478	454	municipal fund	53	15	28	1	0	0	0	0	0	100		0	0	0	0	0	0	0	0	0	1	100	50	60	40	53	0	53	0	10	No	86.6
Joateca	1	15	15	2,668	2,278	12,718.93	143	6	4	1	0	0	0	0	0	100	2 to 3 hours	64	0	7.1	29	0	0	0	0	1	92.9	76.9	23.1	57.1	143	9	134	7	0	no	95.2	
Perquin	1	35	35	4,375	1,622	municipal fund	135	27	20	1	0	0	0	0	0	100	1 to 2 hours	91	9.1	0	0	0	0	0	0	1	81.8	44.4	55.5	18.2	135	25	110	23	0	no	97.2	
Ereguayquin	1	21.95	21.95	12,508	4,394	municipal fund	294	20	7	1	0	0	0	0	2.9	97.1		0	0	0	0	0	0	0	100	1	2.9	0	100	14.3	294	69	225	31	25	no	87	
Villa El Triunfo	n/a	n/a	n/a	n/a	n/a	n/a	780	n/a	-	n/a	0	0	0	0	0	100	0	0	0	0	0	0	2.9	97	0	n/a	57.1	35	65	17.1	n/a	n/a	n/a	n/a	5.3	n/a	85.9	
Nueva Granada	n/a	n/a	n/a	n/a	n/a	s/d	312	n/a	n/a	n/a	0	0	5.7	1.9	0	92.5	0	7.5	11	11	1.9	9.4	59	0	n/a	81.1	31.8	65.9	49.1	n/a	n/a	n/a	n/a	13.2	n/a	81.1		
Total or General Average	4 yes 2 n/a	4 same n/a	2	20,029	8748	12,718.93	625	68	11	4 yes 2 n/a	0		6	1.9	2.9	98		-	-	-	-	-	-	-	4 yes 2 n/a	69.3	40	62	33	572	103	522	20	9	4 no 2 n/a	89		

**ANNEX 3. FINDINGS IN SYSTEMS INDICATORS WITH IMPROVED WELLS AND
MANUAL PUMPS**

GENERAL INFORMATION				IMPACT INDICATORS								EFFECT INDICATORS						TECNICAL CONSTRUCTION INDIC						
Nbr	SYSTEM	Institution	Type of System	% homes reporting deaths during last 5 years		# of <5 years old dead due to diarrhoea by year					% homes presenting diarrhoea today		HEALTH EDUCATION					COMMUNITY WELLS						
						% mortality 1998		1994	1995	1996			1997	1998	% homes presenting diarrhoea last 15 days		% at no risk of water contamination due to handling and storage							% of dwellings with no superficial faeces
1	Agua Zarca, Agua Caliente	PCI	Community well with pump Mark II	0	0	0	0	0	0	0	11	11	22.2	62.5	50	25	89	71.4	92.6	7	6	5	2	1
2	Agua Fría, Guazapa	PCI	Community well with pump Mark II	0	0	0	0	0	0	0	0	30	60	70	80	40	100	98	100	3	2	0	1	1
3	La Estrechura, Chirilagua	CARE	Community well with rope pump	0	0	0	0	0	0	0	0	20	40	87.5	100	13	80	100	83.3	5	3	3	2	1
4	Flamenco, Jocoro	CARE	Community well with pump Mark II	0	0	0	0	0	0	0	10	20	70	60	40	70	100	100	93.3	3	3	3	1	3
5	Cerro Partido, El Paraíso	PCI	Community well with pump Mark II	0	0	0	0	0	0	0	5.6	17	38.9	88.9	61	17	100	71.4	88.8	2	1	1	2	0
6	San Dionisio.	CARE	Residential well with mayan pump	0	0	0	0	0	0	0	10	40	70	80	50	10	100	72	93.3	-	-	-	-	-
7	Los Chilamates, Nva. Concepción	CREA	Community well with rope pump	0	0	0	0	0	0	0	30	41	70.4	72.7	86	4.5	82	79.4	98.7	-	-	-	-	-
8	Metayate, Nva. Concepción	CREA	Community well with rope pump	0	0	0	0	0	0	0	20	30	46.7	50	80	27	100	100	95.5	-	-	-	-	-

Total

ANNEX 3. FINDINGS IN SYSTEMS INDICATORS WITH IMPROVED WELLS AND MANUAL PUMPS

GENERAL INFORMATION				EFFECT INDICATORS															
Nbr	SYSTEM	Institution	Type of System	TECNICAL CONSTRUCTION INDIC														Satisfaction %	
				COMMUNITY WELLS				RESIDENTIAL WELLS						% decrease in summer	% not even for basic chores	% basic and does not affect	% use other sources		
				# with concrete slab	trained 1 yes, 2 no	Have tools 1 yes, 2 no	Pay rate 1 yes, 2 no	# sample wells	Pump working	% enough water	% use other sources	with roof %	concrete slab %						
1	Agua Zarca, Agua Caliente	PCI	Community well with pump Mark II	7	1	1	2	-	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a
2	Agua Fría, Guazapa	PCI	Community well with pump Mark II	3	1	1	2	-	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a
3	La Estrechura, Chirilagua	CARE	Community well with rope pump	5	1	2	2	-	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a
4	Flamenco, Jocoro	CARE	Community well with pump Mark II	3	1	2	1	-	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a
5	Cerro Partido, El Paraíso	PCI	Community well with pump Mark II	2	1	2	2	-	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a
6	San Dionisio.	CARE	Residential well with mayan pump	-	-	-	-	10	8	90%	20	8	100	n/a	n/a	n/a	n/a	90	
7	Los Chilamates, Nva. Concepción	CREA	Community well with rope pump	-	-	-	-	27	26	85.2	19.2	18.5	96.3	33	56	44	23	82.5	
8	Metayate, Nva. Concepción	CREA	Community well with rope pump	-	-	-	-	10	10	100	10	40	100	40	0	100	10	100	

Total

ANNEX No. 4
COMMUNITIES BENEFITED WITH WATER AND SANITATION
BY PROJECT 519 – 0320 y 519- 0394

Item	Community	Municipality	Department	Institution	Beneficiary Population	Current Operation	Type of Project
1	Villa El Triunfo	Villa El Triunfo	Usulután	CARE	2,762	N/a	Pumping- Well
2	Ereguayquín	Ereguayquín	Usulután	CARE	912	yes	Pumping- Well
3	Nueva Granada	Nueva Granada	Usulután	CARE	1,140	N/a	Pumping- Well
4	El Nanzal, Los Jobos, Nisperal	El Santa Elena	Usulután	CARE	4,755	yes	Pumping- Well
5	Canton Los Amates	Santa Elena	Usulután	CARE	2,300	yes	Pumping- Well
6	C/ Llano Grande, Palmeras y Llano El Chilamate	Las Jucuapa	Usulután	CARE	3,000	yes	Pumping- Well
7	C/ El Palón, Las Anonas, Chirrión, San Antonio y San Isidro	El Lolotique	San Miguel	CARE	4,785	inefficient	Pumping- Well
8	Canton San Matías	Ciudad Barrios	San Miguel	CARE	580	inefficient	Gravity
9	Canton Teponahuaste	Ciudad Barrios	San Miguel	CARE	850	yes	Gravity
10	Canton El Jalacatal	San Miguel	San Miguel	CARE	2,526	yes	Pumping- Well
11	Arambala	Arambala	Morazán	CARE	200	yes	Gravity
12	Joateca	Joateca	Morazán	CARE	596	yes	Gravity
13	Perquín	Perquín	Morazán	CARE	654	yes	Pumping- M.
14	Canton Tierra Blanca	Cacaopera	Morazán	CARE	987	inefficient	Gravity
15	Torola	Torola	Morazán	CARE	360	yes	Gravity
16	Canton Ocotillo	San Fernando	Morazán	CARE	200	yes	Gravity
17	Canton Platanares	San Fernando	Morazán	CARE	250	inefficient	Gravity
18	Canton Barrio La Alianza	Corinto	Morazán	CARE	500	yes	Gravity
19	Canton San Francisquito	Yamabal	Morazán	CARE	792	yes	Gravity
20	Canton Hato Nuevo	San Alejo	La Unión	CARE	1,348	yes	Pumping
21	Canton El Tablón **	Pasaquina	La Unión	CARE	1,208	no	Pumping
22	San Dionisio	San Dionisio	Usulután	CARE	245	yes	Residential hand pump
23	C/ La Estrechura	Chirilagua	San Miguel	CARE	1,392	yes	Community hand pump
24	C/ Flamenco	Jocoro	Morazán	CARE	541	yes	Community hand pump
25	Santa Clara ***	Santa Clara	San Vicente	PCI	2,000	no	Electromechanica I pumping-gravity
26	Canton San Pablo ***	Cañales San Idefonso	San Vicente	PCI	3,797	no	Electromechanica I Pumping
27	Canton Santa Cruz ***	Porrillo Tecoluca	San Vicente	PCI	1,421	no	Electromechanica I Pumping
28	Canton Los Amates	San Isidro Labrador	Chalatenango	PCI	267	yes	Gravity
29	San Antonio Los Ranchos	S. Antonio Los Ranchos	Chalatenango	PCI	1,341	yes	Manual Pumping-
30	El Matazano.	San Miguel Mercedes	de Chalatenango	PCI	253	inefficient	Electromechanica I Pumping
31	Canton Conacaste	Concepción Quezaltepeque	Chalatenango	PCI	1,320	yes	Gravity
32	Canton Chilamate	Santa Rita	Chalatenango	PCI	440	inefficient	Electromechanica I Pumping
33	Canton Aposentos	Tejutla	Chalatenango	PCI	451	yes	Gravity
34	Canton Concepción	Tejutla	Chalatenango	PCI	578	inefficient	Gravity
35	Santiago Nonualco	Santiago Nonualco	La Paz	PCI	2,916	yes	Electromechanica I Pumping
36	Canton Corral Viejo	Tenancingo	Cuscatlán	PCI	1,089	yes	Electromechanica I Pumping
37	Canton Rosario El Tablón	Tenancingo	Cuscatlán	PCI	654	yes	Electromechanica I Pumping
38	Canton Copalchán	Tenancingo	Cuscatlán	PCI	486	inefficient	Electromechanica I Pumping

ANNEX No. 4
COMMUNITIES BENEFITED WITH WATER AND SANITATION
BY PROJECT 519 – 0320 Y 519- 0394

Item	Community	Municipality	Department	Institution	Beneficiary Population	Current Operation	Type of system
39	Canton Montepeque	Suchitoto	Cuscatlán	PCI	590	Yes	Gravity
40	Col. Santa Fe	Suchitoto	Cuscatlán	PCI	190	inefficient	Gravity
41	Canton Agua Fría	Guazapa	San Salvador	PCI	73	Yes	Community hand pump
42	Canton El Centro	Agua Caliente	Chalatenango	PCI	83	Yes	Community hand pump
43	Canton Cerro Partido	El Paraíso	Chalatenango	PCI	77	Yes	Community hand pump
44	Canton La Cruzadilla	Apastepeque	San Vicente	PCI	121	no	Community hand pump
45	San Ildefonso	San Ildefonso	San Vicente	PCI	3,401	inefficient	Electromechanical Pumping
46	Canton Blancas	Piedras Pasaquina	La Unión	CREA	1,381	Yes	Electromechanical Pumping
47	La Puebla, Las Brisas y Las Minas	San Matías	La Libertad	CREA	750	Yes	Electromechanical Pumping
48	El Señor, Los Chávez, San Felipe	Quezaltepeque	La Libertad	CREA	861	Yes	Electromechanical Pumping
49	C/Zapotitán, Jorge, San José Cerro de Plata y Tempisque	San Ciudad Arce	La Libertad	CREA	2,284	Yes	Electromechanical Pumping
50	Canton Atiocoyo	San Pablo Tacachico	La Libertad	CREA	2,250	Yes	Electromechanical Pumping
51	Cantons El Sincuyo, Rosario, El Nispero y El Jícaro	El Tacuba	Ahuachapán	CREA	6,342	Yes	Gravity
52	Pandeadura, S. Rafael, La Puerta, Loma Larga y El Rodeo	Tacuba	Ahuachapán	CREA	5,434	Yes	Gravity
53	Canton Santa Rosa	Nueva Concepción	Chalatenango	CREA	1,919	Yes	Electromechanical Pumping
54	Canton Chilamates, Labranza, Esperanza, Los Avelar, Los Solís, El Centro y El Sitio	Los Nueva Concepción La	Chalatenango	CREA	2,324	Yes	Residential hand pump
55	Canton Metayate	Nueva Concepción	Chalatenango	CREA	486	Yes	Residential hand pump

N/a: Not available.

**** This project is not in operation since May 1998**

***** Are not finished. Home survey was not performed nor a complete inspection of infrastructure**
Note. The data on beneficiary population has been taken from the AID's list of communities.

ANNEX 5. CONSOLIDATED FINDINGS ON INDICATORS BY EXECUTING INSTITUTION

EXECUTOR	Nbr. of Systems	IMPACT INDICATORS									EFFECT INDICATORS				
		HEALTH COMPONENT					HEALTH EDUCATION COMPONENT								
		% homes reporting cases of diarrhoea on day of visit (average percentage)	% homes reporting cases of diarrhoea during last 15 day	% Homes reporting deaths due to diarrhoea during last 5 years	% mortality due to diarrhoea in 1998	# of <5 years old deceased due to diarrhoea by year					% at no risk of water contamination from handling and storage	% of dwellings with no superficial faeces	% of clean latrines	% of latrines used	% >5 year olds using latrines
1994	1995					1996	1997	1998							
CARE	14	9	31	0.3	0.07	2	0	0	0	1	56	74	73	90	94
CREA	8	14	25	0.4	0.3	1	0	1	0	1	60	76	72	95	92
PCI	14	16	43	0.5	0	2	0	0	0	0	60	83	62	92	87
TOTAL OR GENERAL AVERAGE	36	13	31	0.3	0.08	5	0	1	0	2	58	80	94	94	90

* Data represent the median from 36 percentages. It is a better representation since data is more disperse.

** It refers to the median. At CARE, the maximum percentage found in 14 communities is 100% and the minimum is 22%. At CREA, the maximum in 8 communities is 100% and the minimum is 83%. At PCI, the maximum in 14 communities is 100% and the minimum is 57%.

*** Percentages are expressed in average percentages obtained from the # of systems per institution. For example, if CREA has 3 communities and the percentages of use of latrines are 50%, 50% and 50%, the average percentage will be 50%. The median is used when data is more disperse. The 36 systems are managed by users.

ANNEX 5. CONSOLIDATED FINDINGS ON INDICATORS BY EXECUTING INSTITUTION

EFFECT INDICATORS															
EXECUTOR	SOCIAL COMPONENT							ADMINISTRATIVE - FINANCIAL COMPONENT							
	% Homes satisfied quantity of water	Participation of women in management				% Managing institutions with legal representation	% users rate between good and excellent the work of managing organization	% management provided with technical file on water system	% management with administrative regulations	# keep same rate	# increase rate	# decrease rate	Income ¢	expenses ¢	Savings at moment of evaluation ¢
		# men	# women	%	% users aproving of women participating in management body										
CARE	99**	98	20	16	86	64	79	0	92	9	4	1	171,809	134,966	510,186.00
CREA	94**	57	5	14	82	100	73	0	100	3	5	0	74056	67,646	525,518
PCI	100**	69	14	16	91	92	78	14	100	7	3	4	49,960	44,799	172,489.90
TOTAL OR GENERAL AVERAGE	100 *	224	39	14	87	83	77	6	97	19	12	5	295,825	247,411	1,208,193.90

ANNEX 5. CONSOLIDATED FINDINGS ON INDICATORS BY EXECUTING INSTITUTION

EXECUTOR	EFFECT INDICATORS																
	ADMINISTRATIVE - FINANCIAL COMPONENT														TECHNICAL CONSTRUCTION COMP.		
	Behavior of payments			% management with operator	% receive 7 days a week	% management with proper concentration of residual chlorine	% homes with less water during summer	% homes with less water during summer and not enough for basic chores	% homes with less water during summer and enough for basic chores or are not affected	% homes using other sources	# Homes supplied presently	Homes connected by managing organization	Homes supplied initially	% of increase	% leaks on taps	# systems with leaks in distribution network	% of latrines in good physical condition
# Users	# Defaulting	%															
CARE	3,397	576	17	93	99	57	53	40	59	23	3,397	28	3369	0.8	8	5	91
CREA	3041	581	19	100	96	62	62	31	65	7	3041	512	2529	20	4	1	94
PCI	2334	407	17	79	100	50	62	31	69	24	2334	219	2115	10	3	6	89
TOTAL OR GENERAL AVERAGE	8,772	1564	18	89	82 *	55	57**	39*	61**	15**	8772	759	8013	9	5	12	91

ANNEX No. 6

INDICATORS ANALYZED IN SYSTEMS OPERATED BY GRAVITY, ELECTRO-MECHANICAL PUMPING AND SANITATION

TYPE OF IMPACT INDICATOR	HEALTH COMPONENT	INDICATOR	UNIT OF MEASUREMENT
EFFECT		Prevailing of diarrhea	% homes reporting cases of diarrhea in <5 years day of visit % homes reporting cases of diarrhea in <5 years last 15 days
		Mortality due to diarrhea	% homes reporting deaths due to diarrhea of <5 years last 5 years % of mortality due to diarrhea in 1998 # of deaths due to diarrhea in 1994 # of deaths due to diarrhea in 1995 # of deaths due to diarrhea in 1996 # of deaths due to diarrhea in 1997 # of deaths due to diarrhea in 1998
		Hygienic habits	% of latrines in use
			% older than five years of age using latrines % of clean latrines % of latrines with paper inside the septic tank or chamber % of homes with no superficial faeces (patio around latrine, etc) % of homes at no risk of water contamination due to handling and storage
	SOCIAL COMPONENT	Satisfaction with service	% users satisfied with the quantity of water received
		Female participation in mngt.	% of female participation in direct managing organization % of users that accept female participation in directive managing organization
		Legal representation of mngt.	% of managing organizations with legal representation
		Perception of managing organization performance	% users rating as good and excellent the work performed by the directive managing org.

ANNEX No. 6
INDICATORS AND SUB INDICATORS ANALYZED IN SYSTEMS BY GRAVITY, ELECTRO-MECHANICAL PUMPING AND SANITATION

TYPE OF INDICATOR EFFECT (...)	COMPONENT	INDICATOR	UNIT OF MEASUREMENT (sub indicators)
	ADMINISTRATIVE FINANCIAL	Existence of technical files	% communities that count with technical files
		Existence of administrative regulations	% of managing organizations that count with administrative regulations
		Maintain at least initial rate	% of managing organizations that keep at least the initial rate
		Increase of initial rate	% of managing organizations that have increased the rate for water service
		Ratio income / expenses	% managing org. with monthly income greater than expenses
	TECNICAL-CONSTRUCTION	Savings	% managing organizations with savings
		Defaulting	% of defaulting users (have not paid on the date established by the organization)
		Trained operator plumber	% of communities that count with trained operator plumber
		Leaks in homes	% of homes with water waste
		Leaks in network	% communities with leaks on distribution network
QUALITY OF SERVICE	Latrines physical condition	% of latrines in good physical condition	
	Continuity of the service	% of users that receive water seven days a week	
	Water treatment	% of systems with residual chlorine between 0.1 y 0.5 mg/liter	
	Continuity of source	% of users whose level of water decreases during summer	
		% of users whose decreased level of water does not affect them or at least is enough for basic needs	
COVERAGE	Increase in connections	% of users without enough water for basic chores due to decreased level of water	
		% of users that use other water sources different from the system	
		% systems that have increased the number of connections, new users	

ANNEX No. 7
SAVINGS PER COMMUNITY AND EXECUTING INSTITUTION *

Community	YEAR OF CONSTRUCTION	TYPE OF SYSTEM	EXECUTING INSTITUTION	SAVINGS PER SYSTEM
CARE				
El Nanzal	Ago-97	E.P		172,940.28
El Palón	Sep-96	E.P		121,207.98
Hato Nuevo	Feb-96	E.P		61,942.25
El Jalacatal	Jan-98	E.P		51,859.79
Llano Grande	Nov-97	E.P		51,405.75
Los Amates	Nov-97	E.P		27,811.24
San Francisquito	Sep-97	G.		18,255.15
Joateca	Apr-97	G		12,718.93
Barrio La Alianza	Sep-97	G		3,644
El Tablón	May-96	E.P		3,478
Teponahuaste	Jul-97	G		920
Ocotillo	Ago-97	G		200
Torola	Mar-97	G		0
San Matías	Jul-96	G		0
Tierra Blanca	Mar-98	G		S/D
Arambala	May-97	G		Municipal fund*
Ereguayquín	May-95	E.P		Municipal fund*
Perquín	Ago-97	E.P		Municipal fund*
Platanares	Jan-97	G		0
CREA				
Pandadura	Dec-95	G		158,320.82
Atiocoyo,	Dec-94	E.P		112,270
Santa Rosa, Nueva Concepción	Jan-96	E.P		60,671.01
El Señor, Quezaltepeque	Mar-94	E.P		43,373.00
Piedras Blancas, Pasaquina	Sep-95	E.P		63,000
La Puebla, San Matías	Oct-94	E.P		38,843.47
Sincuyo	Jan-96	G		32,076.53
Zapotitán	Ago-94	E.P		16,962.70
PCI				
Corral Viejo	Nov-96	E.P		60,251.42
Santiago Nonualco	Mar-97	E.P		44,929.75
Conacaste	Ago-96	G		16,559.90
Copalchán	Dec-94	E.P		16,225
Los Ranchos	Nov-96	E.P		7,236.21
La Conquista	Ago-97	G		5,252.44
San Ildefonso	Mar-97	E.P		5,240.72
Rosario Tablón	Mar-91	E.P		7,219.38
El Matazano	Jul-96	E.P		3,657.37
Aposentos	Sep-96	G		3,257
Los Amates	Jun-96	G		1,500
Chilamates	Apr-94	E.P		1,160.78
Concepción	Jul-96	G		0
Montepeque	95	G		0

** Estimated savings based on average excedents (See Annex 1)

E.P. Electro-mechanical pumping
G Gravity

* Does not include systems whose savings were not able to be determined.

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