



# AGUA PARA LA VIDA - NICARAGUA RÍO BLANCO

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## DRINKING WATER AND SANITATION LOS PINARES, TELPANECA, NICARAGUA - FINAL REPORT -



Project Start: March 17, 2010  
Project Completion: October 7, 2010

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## LIST OF ABBREVIATIONS

APLV	Agua Para La Vida
C/U	Cada Uno (Each)
CRP	Caja Rompe Presión (Break Pressure Tank)
Q	Caudal (Flow)
cm	Centímetro (Centimeter)
cf	Coliformes fecales (fecal coliform)
CAPS	Comité de Agua Potable y Saneamiento (Water and sanitation committee)
Ø	Diámetro (diameter)
DN	Diámetro Nominal (nominal diameter)
°	grado (degree)
HF	Hierro Fundido (iron)
HG	Hierro Galvanizado (galvanized iron)
km	Kilómetro (kilometer)
lb	Libra (pound)
LC	Línea de Conducción (conduction line)
l/min	Litros por minute (liters per minute)
l/s	Litros por Segundo (liters per second)
Ma	Manantial (spring)
m	Metro (meter)
m <sup>2</sup>	Metro cuadrado (square meter)
m <sup>3</sup>	Metro cúbico (cubic meter)
ml	Mililitro (milliliter)
MAG	Mini-Acueducto por Gravedad (gravity flow system)
MINSA	Ministerio de Salud (Health Ministry)
MINED	Ministerio de Educación (Education Ministry)
N/A	No Aplicable (Not Applicable)
O y M	Operación y Mantenimiento (Operation and Maintenance)
PVC	Poli Cloruro de Vinilo (polyvinyl chloride)
qq	Quintal (100 pounds)
RD	Red de distribución (distribution system)
SCH	Tubería de alta presión (>175 m) (high pressure pipe)
SDR	Tubería para presión (<175 m) (normal pressure pipe)
TP	Tanque Propuesto (proposed tank)
U/M	Unidad de Medida (unit of measurement)
NTU	Unidades Nefelométricas de turbidez (Nephelometric turbidity units)

## **1 - INTRODUCTION**

This document is the final report for the drinking water and sanitation project in the community of Los Pinares carried out by Agua Para La Vida from March 17, 2010 to October 7, 2010.

The community of Los Pinares is located 17 kilometers from the Municipality of Telpaneca, Nicaragua and 218 kilometers from the capital Managua.

This project was funded by the Rotary Club of Colorado, the Ann Campana Judge Foundation, the Laird Narton Family Foundation, the Telpaneca municipal government and the community of the Los Pinares.

**Agua Para La Vida**, was responsible for financial management, project oversight and educational programs.

### **Situation before the project**

As with all Agua Para La Vida projects, the initial request for this Project was initiated from the community. This ensures the need for the Project and the motivation of the community.

Los Pinares is a disperse rural community of 60 families with a total population of 310 inhabitants. Of the 60 families, 6 have only an empty lot in the community with the hope of building a house soon. There is also a church and a school.

A portion of the population used a gravity-fed water system with 5 public faucets, and the rest got water from surface water or small hand-dug wells on their own properties.

The existing gravity system, built with assistance from CARITAS in 1995, was designed and built for a population of only 12 families. The situation with the water supply was critical for families because the system did not meet the demand.

In addition, the spring catchment was open and the pipes were in poor condition, resulting in 39 fecal coliforms/100 ml of water. The tapstands were also in poor condition and their locations were no longer relevant.

In the community, 92% of households had no toilets or latrines were in poor condition, resulting in a high percentage of people defecating in the open.

Regarding sanitation, the situation was worrying, the families were not in the habit of eliminating waste properly or keeping drinking water covered. In addition, families had domestic animals running loose, contaminating the community.

Please refer to the proposal for additional details on the characteristics of the community, the situation before project implementation, and preliminary studies of the feasibility of the project.

## 1.1 Project Beneficiaries

### Water

Six families dropped out of the project. Although they had signed individual work commitments, they would not get involved in project implementation. Six other families with lots but no houses did contribute since, according to APLV standards, tapstands will be added when the houses are built (the pipes already goes to their sites).

Consequently 50 tapstands were built stations: 48 for houses, one for the church and one for the school. Six additional tapstands await new houses.

The 56 tapstands represent 285 direct beneficiaries. Since the system was designed for 15 years with a growth rate of 3% annually, the projection of the number of beneficiaries is estimated to 445 beneficiaries in 15 years.

### Sanitation

Forty-nine latrines were built: 48 for homes, plus one for the owner of the spring as part of the agreement (see part 2.2.6.a). These are the same beneficiaries who received water.

## 2 - EMPOWERMENT OF LOCAL CAPABILITIES

Community organization and development of local capabilities is a key part of any successful community project. This community organization depends on good preparation of the project, its good development, and finally the ability of future sustainability.

As mentioned above, social work begins long before the start of physical implementation in order to prepare the community for a successful project.

### 2.1 Activities Completed

During the project, the following activities were completed:

Period	Activities
Nov 09 – Mar 10	<ul style="list-style-type: none"><li>- First contacts with the community, assessment of the need for the project and the social feasibility</li><li>- Presentation of APLV policies and acceptance of these policies by the community</li></ul>
Nov 09 – Mar 10	<ul style="list-style-type: none"><li>- Election of the Water Supply and Sanitation Committee (CAPS)</li></ul>
Nov 08 – Nov 09	<ul style="list-style-type: none"><li>- Negotiations with the landowners of the spring and location of the tank</li><li>- Negotiations to obtain easements for the pipeline</li></ul>
Nov 09 – Mar 10	<ul style="list-style-type: none"><li>- Signed agreements with MINSA, MINED and the municipal government</li><li>- Signed work agreements with each member of the community and APLV</li></ul>
Nov 09 – Mar 10	<ul style="list-style-type: none"><li>- Creation of two groups to organize the work during the execution of the project</li></ul>

	- Agreements with the community to ensure the logistics of the project: staff housing and food, storage for materials
Apr 10 - Sep 10	- Informational meetings, project evaluation and critique
Apr 10 - Sep 10	- Administrative training for CAPS
May 10 - Oct 10	- Technical training for CAPS

## 2.2 Results Achieved

### 2.2.1 Inter-institutional Agreements

APLV executed agreements with the Ministry of Health (MINSA), Ministry of Education (MINED) and the Municipality of Telpaneca.

The aim of the agreement with the MINSA was to create a link between it and the community, especially with the CAPS health promoters.

This link has the long-term objective of providing CAPS members with support from MINSA in the form of future training, water quality analysis, chlorine to disinfect the system, and benefit from campaign to eradicate rats, bedbugs and other pests.

The agreement with the MINED allowed the APLV health promoters to intervene in schools to give talks and community meetings with families. It also enabled them to publicize their activities in health education to MINED and the Los Pinares school teacher so there can be follow-up activities in the future.

The agreement with the Telpaneca Mayor's office stipulated that the municipality would provide signage, water meters, food, tools and materials for the inauguration.. Unfortunately, this agreement was not fulfilled except the donation of tools to start the project and the contribution of food for only two months.

### 2.2.2 Working with the community

We have to mention that the community work was very difficult. The families were active at the beginning of the project but after three months the involvement decreased significantly. The community did not support the APLV technician enough in the remaining activities. To resolve this situation, community organizers generally motivated families with monthly evaluative meetings. In addition, home visits were to families that were not motivated. By the end of the project, each family contributed an average of 50 working days, a significant investment of time and energy.

The food situation was also difficult for the staff of APLV because neither the community nor the mayor responded with this contribution. Several meetings were held to resolve this problem, and food collections were made from each family.

Despite these issues, we had very good participation of women in general in this project. In particular the promoters responsible for Health and Reforestation (see 2.2.3).



**Community Assembly, APLV Promoters**  
**Motivating the community: 'Working together'**

### **2.2.3 Structure and Operation of CAPS**

The preliminary phase allowed us to identify community leaders to form the CAPS.

Then the implementation phase of the project allowed us to evaluate the operation of the CAPS and provide support as they began their work.

CAPS did not have good involvement of all participants, mainly due to the personality of the coordinator. The CAPS coordinator (also Assistant Mayor) is a person who was very authoritarian, did little listening to the other members of CAPS, and at the same time was not fully involved in project development.

APLV seeks to avoid mixing the water project management and political officials in order to avoid conflicts of interest but, as is easily understood, people who have responsibilities at the municipal level are also the leaders of a community.

To improve the involvement of CAPS, APLV staff proposed to the community that they re-elect the committee.

The coordinator was reelected to his post by the community.

Consequently, APLV favored integration of very active people during the execution of the project to reinforce the dynamics of the committee.



**Active participation of the women**



For example, the current head of reforestation became involved with a lot of energy managing materials and reforestation activities, and was then made responsible for monitoring activities in the area of the Environment.

CAPS was structured as follows:

Role	Person in charge	Position
Coordinator	José de Jesús Polanco Matey	Vice Mayor
Vice-Coordinator	Gilberto López vargas	Farmer
Secretary	Gilberto López vargas	Farmer
Treasurer	Alberto Polanco Cárdenas	Loan official
Health	Arcenia González Martínez	Production president
Reforestation	Gloria Talavera	Production secretary
Operations and Maintenance	Severino cárdenas Pérez.	Farmer

Committees were formed in the areas of Health, Reforestation and Operation / Maintenance to support those responsible for carrying out the project activities and future activities

:

- Health Commission: 3 in order to make home visits for litter contro;
- Reforestation: 2 people to allow for sufficient follow-up;
- Operations and Maintainence: 3 people to carry our meter reading and maintenance.



*Community assembly, APLV Community organizer*



### 2.2.3.1 CAPS Administrative training

The following administrative themes were taught to CAPS:

Period	Themes
Nov 2009	Community organizing
Nov 2009	What is a leader?
Apr2010	Work and function of the Drinking Water and Sanitation Committee
May 2010	Administration and Tarrifs
Jun - Sep 2010	Discussion and adoption of rules

For administrative training sessions, we achieved a 95% attendance, despite the difficulty in gathering members, and especially the coordinator, who showed little interest in these trainings.



*Community assembly with APLV community organizer*

### 2.2.4 CAPS Technical Training

The following technical topics and skills were taught:

Period	Theory
Nov 24, 2009	Identification and diagnosis of problems in drinking water systems in rural communities.
Jun 3, 2010	Identifying types of diameters, schedules and PVC and iron pipe fittings
Jun 18, 2010	Operation of the spring, transmission line and its components.
Aug 27, 2010	Methods to carry out flow measurement at the spring, tank and faucets
Sep 3, 2010	Methodology and precautions in handling the system.
Sep 21, 2010	Maintenance, use, meter reading, and billing for water service payment per beneficiary.



**Technical Training, O&M**

Period	Practice
Nov 24, 2009	Practice identifying diameter PVC and iron pipe fittings
Nov 25, 2009	Practice of diagnosis of the most common problems in water systems in rural communities.
May 13, 2010	Installation of system components and the spring capture and reducing the diameter of the pipeline.
Jul 15, 2010	Installation of pipe in various diameters, reducing diameters, valve installation
Aug 17, 2010	Installation of bypass and gate valves.
Sep 6, 2010	Flow measurement at the spring, tank and faucets
Oct 7, 2010	Reading meters and filling out water monthly water bills.

These trainings were conducted so that CAPS members were able to solve problems that might arise in the future. The participants showed interest and gave importance to the subjects taught with respect to their system.

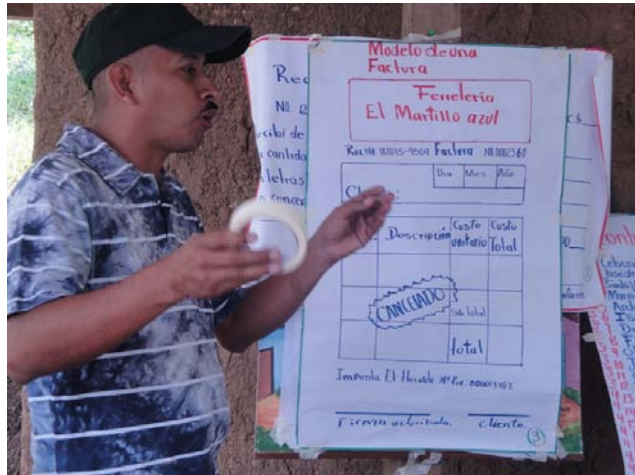
The training 'maintenance, use and meter reading' and 'Monthly household water billing' were conducted with members of the Operation and Maintenance Committee, who are responsible for these tasks.



**Practical training 'Installation of meters'**  
**APLV Technical Project Manager**

These trainings can be a little hard to digest for community members with very little education.

To support these members and consolidate the knowledge with more confidence in the meter reading and billing, we asked two young men who are currently studying 4th year high school to participate in this training and to form a support group for these tasks



*Water Billing Training, APLV Community Organizer*

## 2.2.5 Agreements

### a) Spring

In this project we used two sources of water.

- The first spring is located on the property of Mr. Genaro López Polanco. The owner gave the water rights to the community in exchange for a tapstand. This agreement was legalized through a notarized agreement.
- The second spring is located on the property of Mr. Justo Gómez Matey. This owner also gave the water rights to the community in exchange for a tapstand. In addition, he was given a latrine to help prevent fecal contamination of the spring. This agreement was also legalized through a notarized agreement.

### b) Tanque

The land under the tank was donated by Mrs. Antonia Melgara Varela, owner of the plot, in exchange for a reduction in work days to 15 days to get her tapstand.

### c) Easements for the pipeline

Legal agreements were made for the passage of the pipeline from the spring to the tank..

## 2.2.6 Future management of the water system

### 2.2.6.1 General Organization and Maintenance

CAPS was organized to ensure the ongoing proper use, operation and maintenance of the water system. CAPS is certified by the council and approved by the local authorities of the municipality, which guarantee for order and compliance with articles that were established in the Rules of Procedure of the community. The committee was trained and is responsible for maintaining the project. To enforce regulation, they can use the authorities if necessary, and will be supported by them to implement sanctions. In this case we will request the support of Police, Mayor and Local Judge of the municipality.

The CAPS is responsible for fulfilling the following tasks to maintain the water system:

- Operate, monitor and manage the water system;
- Comply with the monitoring of the protected spring, preventing fires or deforestation in the same area;
- Clean spring boxes, tanks and other places that require continuous monitoring;
- Perform preventive maintenance on the system;
- Read the meters each month and make the bills for water consumption of each family;
- Manage the maintenance fund with responsibility;
- Conduct information meetings and coordinate additions to the water system;
- Coordinate social activities and management consulting for purposes that lead to sustainability and empowerment of the water project;
- Manage technical advice and negotiate payment for the right to add additional faucets

#### **2.2.6.2 Billing and financial control**

The water tariff was defined according to the needs of system maintenance. Its value is \$1 per month per family. This fee entitles the family to 13 m<sup>3</sup> of water per month, which corresponds to approximately 70 liters per day per person. To consume more than this volume, the family will pay an additional \$0.25 per additional cubic meter.

This system allows for good management of water resources but if abuse occurs, the internal regulations, in conjunction with the Water Law states that a penalty to be paid to CAPS.

The money is raised by two members of CAPS monthly and will serve to cover the future maintenance costs (broken component, purchases of chlorine to clean the tank, etc.). Financial control is carried through a written record where all income and expenses are recorded.

To qualify for a new connection, the applicant shall pay to the treasury of CAPS the amount of \$275 or the equivalent in national currency at official exchange rate, on top of any needed pipes, fittings, and faucets.

The monthly bills and the payment for new connections are two incomes essential to maintain the financial health of the structure and ensure the system sustainability.

### 3 - GRAVITY DRINKING WATER SYSTEM

#### 3.1 Technical summary

The following tables contain a summary of the system components and the piping

Item	Description	Units	Design	Actual	Actual (%)
1	Spring capture	C/U	2	2	100%
2	Conduction line	m	1176	1176	100%
3	Storage tank	C/U	1	1	100%
4	Distribution system	m	6550	5601	85.5%
5	Tapstands	C/U	62	56*	90.3%
6	Drains	m	744	600	80.6%
7	Meters	C/U	62	50	80.6%

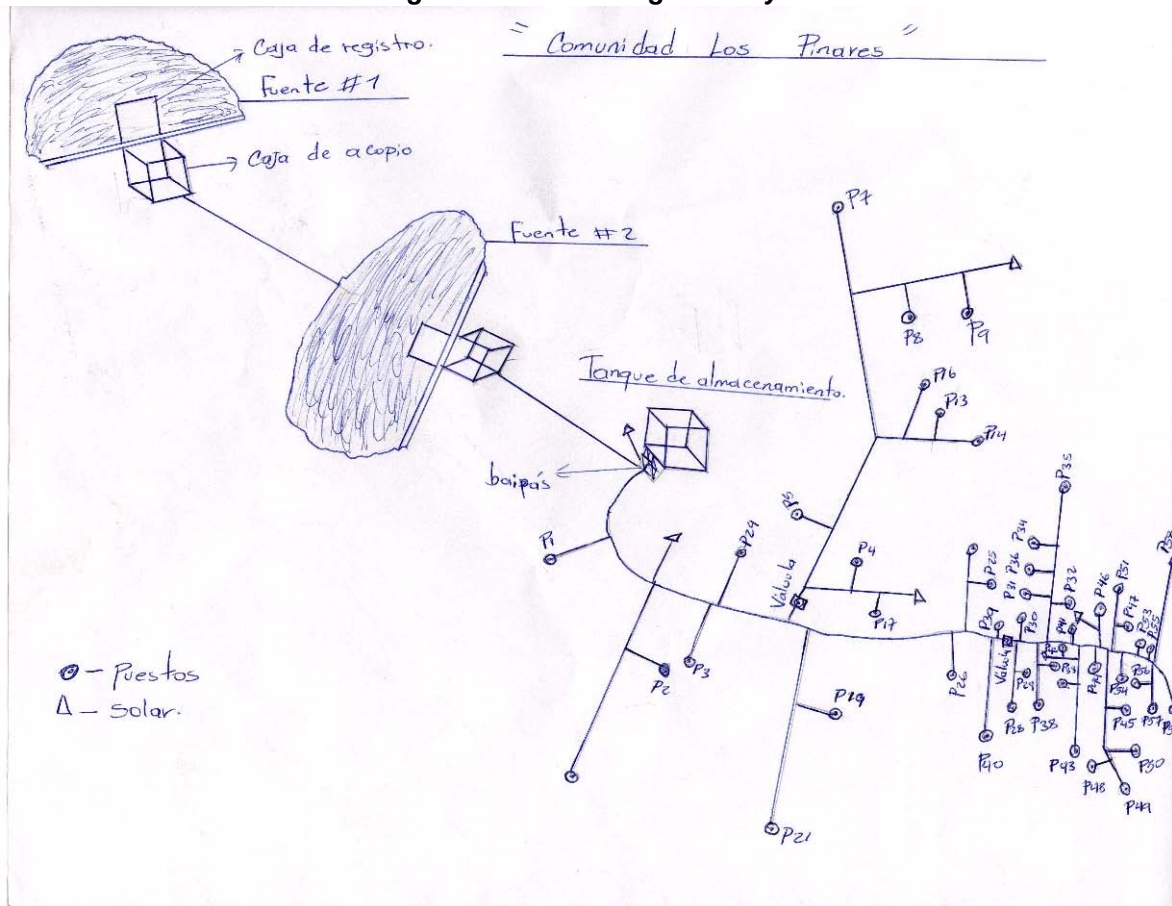
\*There were 50 tapstands buit, and 6 to be built

Piping	Conduction (m)	Tank (m)	Distrib (m)	Tapstands (m)	Drains (m)	Total (m)	Pipes (#)
Tubos ø ½" SDR 13.5	191		2265	40		2496	416
Tubos ø ½" SCH 40			760.4	5.6		766	127.7
Tubos ø 1 ¼" SCH 40			249			249	41.5
Tubos ø 1 ½" SDR 32.5		1.6	358.4			360	60
Tubos ø 1 ½" SDR 26			143			143	23.8
Tubos ø 1 ¼" SDR 17			735			735	123
Tubos ø 1"			108			108	18
Tubos ø 1" SCH 40			363			363	61
Tubos ø ¾" SCH 40			381			381	63.5
Tubos ø 2" SDR 41					600	600	100
Tubos ø 1" SDR 26	660					984	110
Tubos ø ¾" SDR 17	322.4	1.6				324	54
Tubos ø 3" SDR 41		1.6				46.4	6
Tubos ø ½" HG				30		30	5



### 3.2 Description of the system

**Diagram of the drinking water system**



#### Spring Capture

In this system, we built two closed spring catchments that produce sufficient flow to the demand of the population projected to 15 years. Both are east of the community with a boundary on a nature reserve.

#### Conduction Line

We installed two conduction lines to carry water from the springs to the tank. As per APLV norms, there are no tapstands or connections in this part of the system to guarantee the quantity of water reaching the tank.



**Collection box at the spring**



**Conduction line trench**



## **Storage Tank**

The tank is situated in one of the highest parts of the community. It has a volume of 13 cubic meters. It includes a bypass connection that can redirect water directly from the spring to the tapstands. This bypass permits cleaning and maintenance of the tank without interrupting the flow of water to the distribution system.



***Construction of the tank by the community***



***Bypass connection of the storage tank***



***Work of the community***



***Completed storage tank***

### **Distribution System**

The distribution system carries the water from the tank to the household faucets. TO ensure that the system works well, careful hydraulic calculations were made so that each faucet receives sufficient flow and so the capacity of the system meets the needs of the community.

Gate valves were installed to enable dividing the system into sections. This is important to allow for repairs and maintenance of the system.

***Trench and pipe of the distribution system***



***Gate valve***



### **Household tapstands**

Each household tapstand includes a concrete pad and drain with a pipe that leads drainage water away from the tapstand. Faucets were installed at a height of 1 meter and were designed for a flow of 8-10 liters/minute.



***Final construction of a household tapstand, including drainage***



### **Meters**

Meters were installed at each tapstand according to APLV norms. Meters help the community use water more conscientiously. Each household pays a monthly fee as detailed in section 2.2.7.2.





### 3.3 Water quality

APLV carried out water quality analysis to determine the quality of the community water source before and after the project. The spring water quality was also analyzed before and after the project to test the effectiveness of the protection of the spring. The following results were obtained.:

	Date	Measurement Site	Turbidity (NTU)	Volume tested (ml)	Number of fecal coliform
<b>PRIOR TO THE PROJECT</b>	29-11-2009	Spring	< 5	100	49
	29-11-2009	Public tapstand	< 5	100	39
<b>AFTER THE PROJECT</b>	10-08-2010	Spring box	< 5	100	6
	10-08-2010	Tapstand (Catholic church)	<5	100	5

Prior to the project, community water supplies were heavily contaminated as evidenced by the high fecal coliform as was the proposed spring.

The construction of the spring capture box and fencing around the spring has significantly reduced the contamination of the spring water.

The last measurements were made during the rainy season at the completion of the project. Contamination tends to be higher during this period as there is significant surface water.

Over the next year, we anticipate the the water quality will continue to improve even further as animals and people will be kept away from the area immediately surrounding the spring.



***APLV health educator demonstrating to the water committee how to test water quality***

Also, the results show that no contamination is entering the system after the spring, as the quality at the faucets is the same as the entering spring water.

This water project as brought a much higher water quality to the population. To maintain high water quality, the water committee health educators will work with the local Health Ministry office to test the water 3 times annually and to disinfect the system with chlorine regularly.

### 3.4 Resolution of technical problems encountered

The only technical issue with this project was that some points of the system were under high pressure due to the large differences in elevation in the system. In these sections, pipe rated to higher pressure were used.

## **4 - RURAL SANITATION**

### **4.1 Latrine design**

Latrines are located in the backyards of each house.

Latrines were elevated 1 meter and included an additional 1 meter deep foundation below the surface of the ground. They include a special seat that makes them safe and convenient for children.

### **4.2 Latrine construction**

Latrines were constructed by the community members after being taught how to construct them by APLV masons who built a demonstration latrine with the community.

Each family was then involved in building the latrine for their household.



*Letrina construida con taza para los niños*

### **4.3 Results**

All forty-nine (49) latrines were constructed as per the project plan (48 for community households and 1 for the spring owner). All latrines were of high quality and met the design goals. Sanitation coverage in the community is now 80% compared to 8% prior to the project.

## **5 - HEALTH AND HYGIENE EDUCATION**

### **5.1 Activities undertaken**

The following health and hygiene themes were covered with the families of the community:

Períod	Health and Hygiene Themes	Participants	Participation
Nov 2009	Introduction to the objectives of the program	56 families	100%
May 2010	Leadership and role of the promoters	9 members of CAPS	82%
May 2010	Elimination of solid and liquid waste	41 family representatives 36 school children	Adults: 73% Children: 67%
Jun 2010	Personal hygiene and nutrition	39 family representatives 45 school children	Adults: 70% Children: 80%
Aug 2010	Water use and management	36 family representatives 42 school children	Adults: 64% Children: 75%
Aug 2010	Water system monitoring	7 members of CAPS	64%
Sep 2010	Latrine use and maintenance	49 heads of families, 36 school children	Adults: 100% Children: 64%

The issues discussed were chosen in order of priority, taking into account the profile of community health hygiene.

The targeted groups for strengthening the overall health of the community were: heads of family, school children and members of the CAPS. Our goal was to improve sanitary habits encourage them to incorporate better habits into their daily lives.



***APLV Health Educator teaching on the issue of "Monitoring the Health of the Water Syetem"***

We choose times available for these groups, without interrupting their daily activities. We also coordinated with the MINED to determine the time spent to teach these topics.

### **Specific objectives**

- 1- the theme of 'Leadership' given to members of CAPS, they are expected to be able to lead the rest of the community in activities that encourage family and community hygiene, and in turn project sustainability;
- 2- the theme of 'Garbage' aimed at adults and children, behavioral changes are expected in the elimination of waste, in order to reduce vector-borne diseases;
- 3- the issue of 'use and proper management of water' is expected to reduce water-borne diseases.
- 4- the theme 'Use and management of latrines', is expected to reduce infectious diseases;
- 5- the theme 'Personal hygiene and nutrition', is expected to strengthen habits of personal hygiene and nutrition.

## Procedure

The issues begin with the presentation of the case and objectives. We tailored the presentations according to the educational level of participants - simple, participatory and approximately 60 to 90 minutes in length.

We use a methodological design that helps guide the APLV health promoter's approach. Teaching methods include charts, pictures, brochures, flip charts, poster, all developed to be clear and persuasive.. To evaluate the understanding of the participants, we allot time for questions and comments. We finish with a review.

## Assistance

One of the difficulties was the inability of some families to participate due to the planting season for crops and work commitments that many have in the coffee plantations. In effect, they reported that they could not stop going to work; they were charge for any days missed. Despite these obstacles, overall attendance was quite high.

## 5.2 Results achieved

To assess the impact of health and hygiene program, home visits were conducted to interview and use direct observation to collect information on health and sanitation. 100% of the families were visited to obtain data.

The indicators were chosen based on the subjects taught and using parameters that can be measured in the short, medium and long term. These results were obtained in the implementation stage, once the families had water to evaluate the change in behavior and benefit from the workshops, but before the end of the project to learn about successes and difficulties.

A summary of results is presented in the table below:

Indicators	Prior assessment	Achievements
Access to latrines for children	0% of latrines had seats appropriate for children	98% of latrines had seats appropriate for children
Covered latrines	100% of latrines were uncovered	98% of latrines were covered
Standing water	90% of households had standing water around the house	81 % had eliminated the standing water
Garbage	100% did not eliminate garbage adequately	77% of families were doing a satisfactory job eliminating garbage
Control of domestic animals	100% of families had not controls	51% of the animals were fenced in
Grooming	46% of the families did not properly groom children	75% were properly grooming children
Proper water use	73% of families kept drinking water covered	83% kept drinking water covered



## **Analysis of Results**

In improving environmental hygiene, families improved their disposal of garbage and elimination of standing water. In some households, the change in attitude is affected by the absence of mothers during the day as they work as laborers away from the house, leaving the home cared for by children. For these families, follow up monitoring will be provided by CAPS health promoters.

With respect to the control of domestic animals, half of the families have taken simple measures such as tying or making small cages. For the other families, many are poor and find it difficult to acquire materials to build enclosures for their animals.

With regard to water storage, they made use of public faucets and hauled water to their homes, a large investment of time. Now they have the privilege of water placed in their homes enabling them to consume more water of a higher quality compared with before.

Regarding the proper storage there was an improvement of 10% because these families do not have good containers with lids, although we observed that they are clean. But there have been changes in the handling of water, using a cup or other container to remove it from storage vessels.

In a matter of personal hygiene, one difficulty encountered was the cold weather in the area. In fact, the mothers argued that bathing the children every day can be damaging to their health. APLV educators suggested that families can use a damp cloth to clean the body and hands to help keep the children from catching colds.

The changes in attitudes are generally very positive and we expect continued improvements with future follow up from APLV and CAPS promoters.

### **5.3 Ongoing monitoring**

The CAPS health promoters are responsible for monitoring the health and hygiene program with the support of the entire CAPS. They were directed to coordinate with the Ministry of Health for water testing, campaigns to eradicate rats and bedbugs (Chagas disease) and the acquisition of chlorine to disinfect the system. Also coordination with MINSA was promoted through the teachers who will follow with lectures for schoolchildren and parents.

APLV will monitor for about 6 months during which time we will visit in conjunction with the community organizer to conduct follow-up analysis on the system and environmental and personal hygiene of community.

## **6 - ENVIRONMENTAL PROGRAM**

### **6.1 Summary of the watershed situation**

The top of the watershed is a protected area, a distance of approximately 900 meters from the two springs used for the project.

The springs are surrounded by a coffee growing area, where coffee is mixed with other tree species (Lemongrass, guava, avocado Canelo, Laurel, walnut...). These trees are used to shade coffee: coffee with shallow roots covers most of the area while deep-rooted trees are scattered.

The lower section of the watershed is mainly used for annual crops, the middle and upper sections primarily for coffee with a small amount engaged for the production of basic grains (maize and beans).

Consequently, the watershed is not in need of increased forest cover. However, there is a need to improve the protection and securing land in the vicinity of the second spring capture, thus allowing better water infiltration and avoiding the collapse of the bank.

## **6.2 Activities undertaken**

### **6.2.1 Development of coordination between local participants**

We worked with local stakeholders who are the owners of the springs, the CAPS and community beneficiaries. As mentioned in Part 2.2.6, we successfully implemented of legal agreements to donate the springs to the community.

### **6.2.2 Protection of the Spring and Developing Watershed Awareness**

Community members fenced the areas around both springs with wooden posts and barbed wire to prevent damage and contamination.

We planted grasses and lemon valerian in steep areas to help stabilize the soil.

Community participation in these activities was quite low 4 people were very active, including 2 women.

One of the women became very interested and motivated and then joined the CAPS as the person responsible for reforestation activities.



***Planting grass in the area near the second spring***

On her initiative and with support from APLV, a nursery of 500 trees of guava and walnut was established to be planted in the watershed as needed and the rest nearer the community to promote the planting of trees.

Training was carried out for both children and adults. The methodology used was simple and adapted to the educational level of the community. The main goal was raising community awareness about the importance of environmental protection, in particular for the micro-watershed that is the source of the community's water and for the care of the spring catchments.



*Tree nursery in its initial phase*



*The same nursery later on*

### **6.3 Results achieved**

Improvements were made in the stability of the soil near the second spring to help reduce the risk of landslides. However, the low participation of the community did not allow as much to be accomplished as was hoped. We advised the community to follow up over time by collecting and planting more grass in this area and to stay vigilant with respect to the springs and the surrounding micro-watershed.

APLV will follow up with a visit in the coming months to continue supporting the community.

## **7 - CONCLUSION**

### **7.1 Achievement of Objectives**

The objectives of this project of integrated water, sanitation, health and hygiene and environments were achieved. Beneficiary families now enjoy quality water in sufficient quantity and near their homes. Also, the community now enjoys a high coverage of sanitation which will improve the health of residents. The families were sensitized to the problems of hygiene, expanded their knowledge in this area and most of all greatly improved their daily behavior. The community was sensitized to the preservation of the environment and in particular water resources.

The Committee on Water and Sanitation has been trained in all aspects of the proper administration of its their system: technical, administrative and financial. These components of the integrated project will enable the community in the medium term to significantly reduce waterborne diseases. Since September, the availability of water in quantity and quality has begun to improve the quality of life for residents.

### **7.2 Lessons Learned**

APLV was able to develop its capacities to implement projects away from its operational base located in Rio Blanco.



### 7.3 Acknowledgments

We thank the community for their participation and efforts in the development and implementation of this project. Thanks to mayor's office of Telpaneca for their contribution.

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