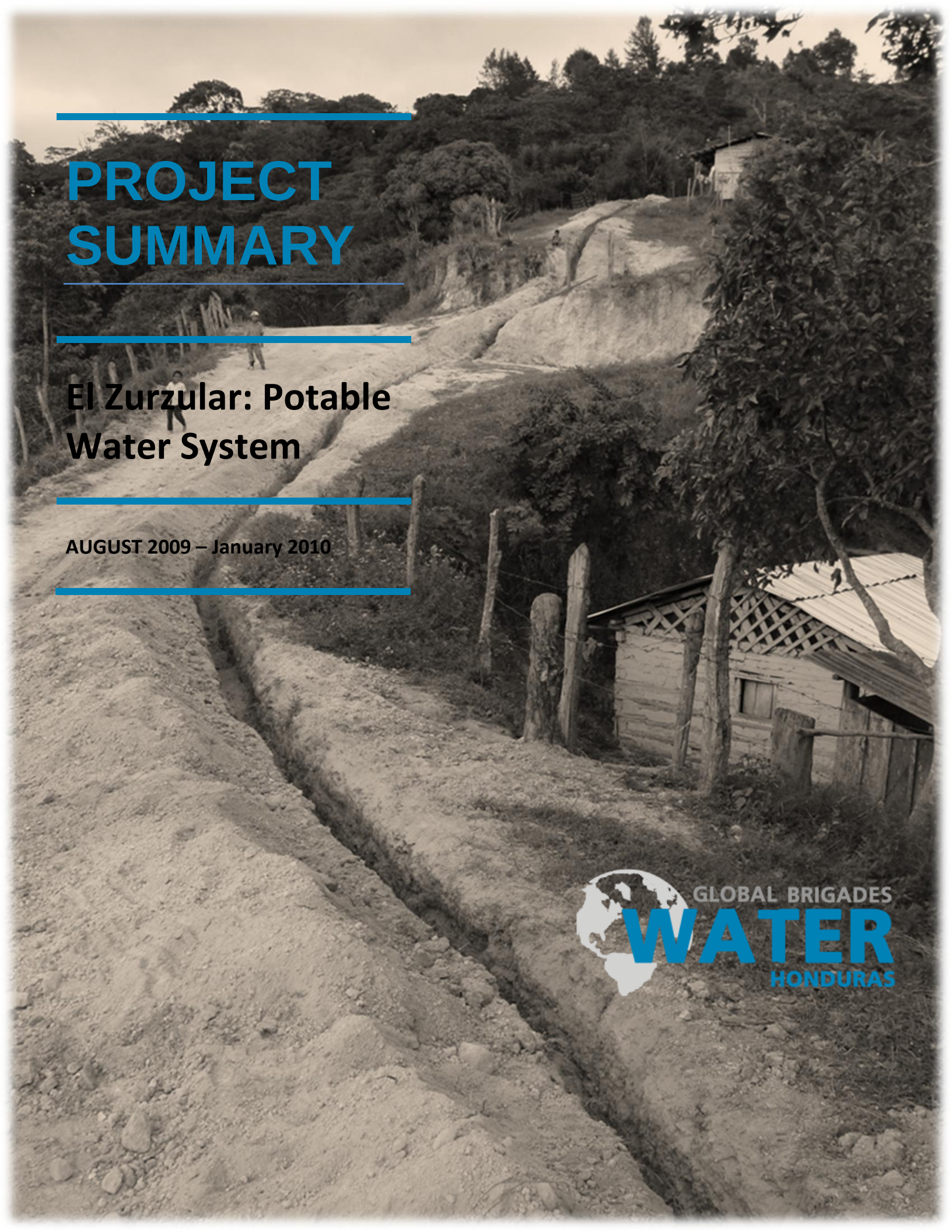


# PROJECT SUMMARY

## El Zurzular: Potable Water System

**AUGUST 2009 – January 2010**

GLOBAL BRIGADES
WATER
HONDURAS

# INTRODUCTION

## Location

The community of El Zurzular is under the jurisdiction of the Municipality of San Juan de Flores located within the department of Francisco Morazán. It is located approximately 120 kilometers from Tegucigalpa and can be reached on a combination of paved and second class dirt roads. It is accessible year round; however, heavy rains can make access difficult. The primary economic source in the community is agriculture, the majority of which is the growth of coffee.

Home and family in El Zurzular

## Public Services

The following public services are offered in El Zurzular: a basic health center, elementary school, kindergarten, several churches (Catholic and Evangelical), cellular telephones, and some basic sanitation infrastructure (improved latrines).

## Population

There are a total of 87 houses in El Zurzular, including inhabited, uninhabited, and in construction. The total population including men, women, and children is 507.

## Background

The community of El Zurzular's previous potable water system was constructed 24 years ago in 1986. Since then the system has not had any type of improvements implemented on it. The system was originally designed and built for only 30 homes. After 24 years of population growth the system was no longer able to provide water to the 87 homes now existing in the community. It was determined that a reconstruction of the system was necessary in order for the entire population of El Zurzular to have access to sufficient, clean water. El Zurzular is a very under resourced community. The community did not have the necessary resources (funds and expertise) to be able to reconstruct their water system. The community had previously solicited help from government organization without receiving help. Water Brigades came to an agreement with the community of El Zurzular to assist in the reconstruction of their potable water system.

Child from El Zurzular works in a coffee field

## SYSTEM DIAGNOSTIC

Water Brigades visited the community of El Zurzular various times between the months of June and July 2009. The purpose of these visits was to complete a diagnostic of the previous system to determine the following existing problems:

- The system was 24 years old and was only serving 54 of the 87 homes in the community. The 33 unconnected homes were therefore either without water, gathering water from streams or other sources, or were getting water from their neighbors when possible.
- No control of the system was in place. Valves were not utilized correctly, leaving large sectors of the community without water for days at a time.
- The conduction line and distribution network were made up of pipes of diameters of 1 ½" and 1". This size of piping was preventing the community from receiving the necessary amount of water.
    - The flow rate entering the storage tank was 12 gallons per minute (gpm), a quantity insufficient for 87 households.
- Due to improper maintenance and treatment, pipes had extensive biological and sediment buildups essentially decreasing their diameters further.
- Significant sediment levels in the small reservoir at the water source, storage tank, and at people's domestic connections was affecting water quality and quantity.
- The community's chlorination system was damaged and water had not been chlorinated in over 12 years according to community leaders. The water was not being treated in any way.
- In the six months leading up to July 2009, the Health Center of El Zurzular had seventeen reported cases of diarrhea in children under the age of five. Considering these are the cases that were extreme enough to warrant a visit to the health center, this number is alarming.
- The Water Council existed of only three members of the required seven. These three members had stopped holding meetings, operating, maintaining, and administering the system correctly.
- A Basic Sanitation Committee did not exist.
- Based on discussions with community leaders and a socio-economic survey, it was seen that almost all community members had stopped paying their monthly water fee.

Original state of dam

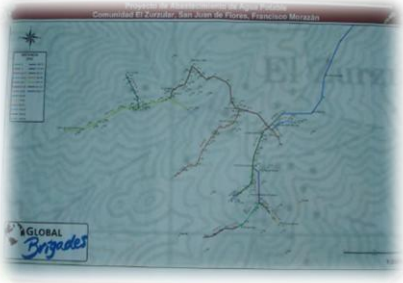
System diagnostic – July 2009

Reviewing original chlorinator

## PRE- IMPLEMENTATION

Once the problems and needs of the community had been determined Water Brigades worked with the community through a series of visits and community meetings before project implementation to ensure that there was a high level of understanding and collaboration during implementation. During these visits the following was completed:

- An agreement was reached with the community that a complete reconstruction of the water system was the best solution to their water related problems.
- It was determined that the project would be completed in two stages, the first in August 2009 and the second in December 2009.
- A detailed study of the previous system was performed with the support of community members.
    - A map of the previous system was created using GPS, and the locations of new piping in the conduction line and new branches of the distribution system were determined.
    - All new pipelines were measured to determine the amount of piping, glue, valves, accessories, and other materials that needed to be purchased to complete the reconstruction.
    - Necessary pipe diameters for all branches of the distribution system were determined based on branch distance and number of homes served by each branch.



Map of new water system in El Zurzular

- The community was presented with the methodology of Water Brigades.
- A new seven member Water Council was established by the community with the support of Water Brigades
- A Basic Sanitation Committee was established by the community with the support of Water Brigades.

Presenting WB work methodology & project in a community meeting

- A Contract of Construction and Cooperation was established outlining the responsibilities of both Water Brigades and the community of El Zurzular.
- All right of ways were obtained for new piping which was to cross private property.
- The work requirement for each home in El Zurzular was determined so that home could retain or obtain its domestic connection.
- A work plan was developed with the community to organize work groups and group coordinators to record days of work completed by each community member.

## IMPLEMENTATION: Stage I

Stage I of project implementation was done in the last two weeks of August 2009 with Water Brigades groups from New York University, University of Texas Arlington, and Washington University. The following aspects of the project were worked on during Stage I: the water source and dam, the conduction line, the chlorination tank, a system test, educational seminars, and the Water Council training.

### Water Source & Dam

Work at the water source began with draining and cleaning out all sediment that had built up in the reservoir over the years. A filter was then built and installed to filter out large particles (sand, pebbles, leaves, etc.). The filter design consisted of a network of 3" PVC pipe with slots cut into the underside of each pipe. The ends of all pipes were capped so that water could only enter through the underside of the pipe network. Sediment will settle on the bottom of the reservoir and not flow in an upward motion through the slots. Rocks of increasing size were placed on top of the PVC filter network to further promote filtration.

Filter construction

Filter installation

Finished, installed filter

### Conduction Line

The conduction line was constructed of both PVC (plastic) and GI (Galvanized Iron) pipes. Wherever possible, trenches (60 – 100 cm deep x 30 cm wide) were dug in order to lay the relatively less expensive PVC pipe. On rocky terrain or for stream/gorge crossings GI pipe was installed. Over 3,600 meters of trench was dug by community members and student

Trench dug for conduction line

Students pickaxing trench for conduction line

Installation of first lengths of GI pipe in the conduction line

volunteers. Students and community members installed 15 lengths (~6 m/length) of 2" GI pipe, 230 lengths of 2" PVC pipe, and 365 lengths of 1 ½" PVC pipe to complete the over 3,700 meter conduction line.

In addition to the piping, ten valves were installed over the length of the conduction line. The valves installed were the following:

- 1 Outlet valve: allows the quantity of water leaving the reservoir and entering the conduction line to be controlled.
- 4 Cleaning valves: installed at low points of the conduction line, these valves allow for any sediment that does manage to get into the pipeline to be flushed out.
- 4 Air valves: installed at high points of the conduction line, these valves allow for any air that has built up in the pipeline to be released.
- 1 Inlet valve: allows for the quantity of water entering the storage tank to be controlled.

A covered valve box was constructed for each valve for protection of the valve and security.

One of four air valves with valve box

Inlet valve to storage tank with valve box

## Chlorination Tank

Repaired chlorination tank with float and tube system installed

Leaks in the previous chlorination tank were repaired and the tank was given a new cement finishing layer to prevent leaking in the future. An inlet valve was installed to allow for the chlorination tank to be filled easily. A new slow drip faucet was installed for the introduction of chlorine into the storage tank. The faucet was located so that the chlorine drips would fall directly into the inlet stream promoting mixing within the tank. A float and flexible plastic tube were installed and connected to the chlorination drip outlet pipe as opposed to a ridged PVC pipe to maintain equal pressure over time resulting in a consistent drip rate.

## System Test

Once all pipes and valves were installed and the chlorination tank was complete the system was tested. Water was allowed into the conduction line by slowly opening the outlet valve at the dam. Each subsequent valve on the line was then closed slowly as water filled the pipeline.

Water successfully reached the tank without any leaks in the pipeline. A new flow rate of 38 gpm was achieved. The chlorination tank was tested and no leaks were detected. A consistent chlorination drip rate was achieved.

38 GPM entering tank through new conduction line

## Educational Seminars

Between the three brigade groups in El Zurzular in August 2009, a series of educational seminars were executed. Seminars were directed at children, women, and families. Through various educational methods (skits, games, visual aids, etc.) the following topics were covered:

- Gender roles
- Water conservation
- Water and illness
- Water treatment
- Sanitation
- Hygiene
- Hand washing

University of Washington students performing education skit for children

## Water Council Training

In the weeks following the system test Water Brigades staff trained the new seven member Water Council of El Zurzular. The community plumber was also trained. The training covered the following topics:

- Leadership
- Organization
- Community participation
- Monthly water fee
- Book keeping
- System administration
- System operation
- System maintenance
- Parts of a water system
- Watershed protection
- Water treatment
- Honduran water law
- Water Council roles and responsibilities

Water council training

Plumber being trained on chlorination process

Measuring chlorine drip rate

## IMPLEMENTATION: Stage II

Stage II of project implementation was done in one week in December 2009 with a Water Brigades group from DePaul University. The following aspects of the project were worked on during Stage II: the distribution network, domestic connections, educational seminars, treatment system test, and Basic Sanitation Committee Training.

### Distribution Network

All piping from the existing distribution network was replaced. The design of the distribution network was changed where necessary, and new branches were installed to ensure that water arrived consistently to all domestic connections. Over 3,000 meters of trench was dug by student volunteers and community members. PVC and GI pipe of the following diameters was installed: 3", 2", 1 ½", 1" and ½". Control valves and valve boxes were installed where determined necessary for the proper control and operation of the system.

Reviewing distribution system plan with student volunteers

DePaul University students dig trenches for installation of new distribution network

Distribution network pipes being glued together

### Household Connections

New household connections were fabricated using GI pipe and faucets. Connections were installed in all houses without a previous connection. In addition, houses with non-functioning or deteriorated connections also receive new connections. Once completed, 100% of the houses in El Zurzular were connected to the water system.

Fabrication of houshold connection: Pipe being threaded

Installation of a new household connection

### Educational Seminars

Students from DePaul University implemented an educational program for community members in El Zurzular in December 2009. Issues such as water use, water quality, proper hygiene practices, and related topics were covered.

### Treatment System Test

Once the new distribution network was complete, the system was flushed with chlorine. The system was then run with normal chlorine treatment for 5 months. Microbiological contamination analysis was then performed in strategically selected household connections in the community. All 14 connections tested negative for microbiological contamination.

### Basic Sanitation Committee Training

The Basic Sanitation Committee (Comité de Saneamiento Básico) in El Zurzular was completely trained. The Committee was trained in how to properly execute the Healthy Homes and Schools Program (ESCASAL). The Committee's responsibilities include being sanitation and hygiene experts in their community and making visits to all houses in their community to educate on and monitor: in home water storage, latrine maintenance, household cleanliness, and personal hygiene.

## PROJECT SUMMARY

The El Zurzular water project was a great success for the community, Water Brigades, and all brigade groups who were involved in the project. The project was inaugurated on January 22nd, 2010.

An incredible success in the El Zurzular project was the community participation and the resulting interaction between community members and student volunteers. In typical communities, a group of men works each day on the water project, and each group is normally about one quarter of the adult male population of the community. However, in El Zurzular, a representative from every house in the community worked on the project every day. This amounted to approximately 90 men from the community working alongside student volunteers on a daily basis. This allowed Water Brigades to finish the water project much more rapidly than anticipated.

Water Council receiving diplomas at inaugurtion ceremony

Community participation

The following project components were completed:

Water connection turned on for the first time at house in El Zurzular

- Improvements were made to the dam
- A filter was installed at the dam
- A completely new conduction line was installed
- The storage tank and chlorinator were repaired
- All necessary cleaning, air release, and control valves were installed
- The entire distribution network was redesigned and constructed
- Houses previously without water connections were connected to the new system
- Houses with non-functioning or deteriorated connections received new connections
- A Water Council was established and trained
- A Basic Sanitation Committee was established and trained
- Educational seminars were implemented covering a range of water, sanitation, and health topics
- No microbiological contamination was found in any of 14 tested household connections 5 months after project completion
- Zero cases of diarrhea in children under 5 years old were reported in the first 6 months after the completion of the project