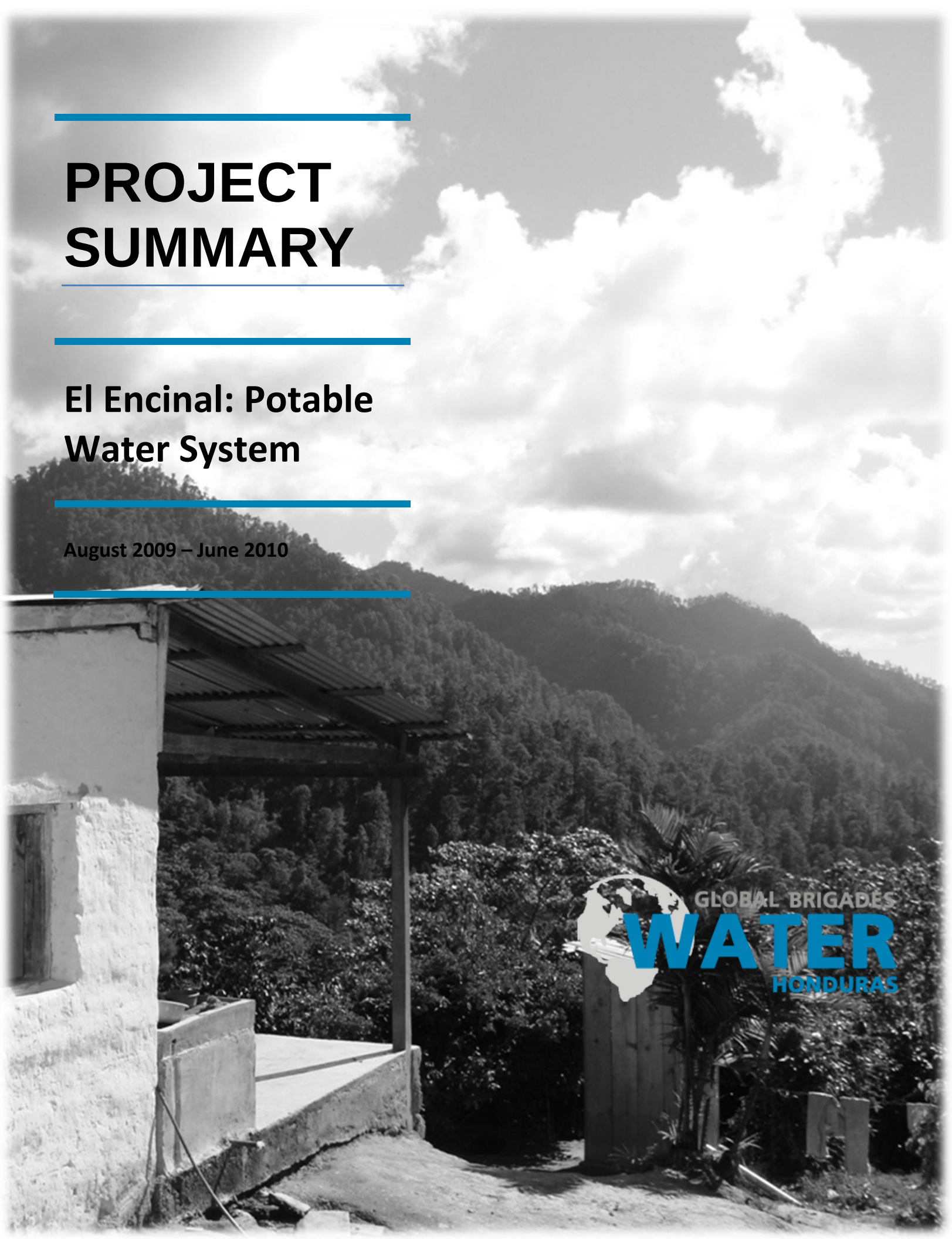
PROJECT SUMMARY

El Encinal: Potable Water System

August 2009 – June 2010



INTRODUCTION

Location

The Community of El Encinal is within the jurisdiction of the municipality of San Juan de Flores, in the department of Francisco Morazán in the central region of the country, located approximately 80 kilometers from Tegucigalpa. El Encinal belongs to a group of communities which is referred to as Joyas del Carballo. The other major community in Joyas del Carballo is El Junco. The principal economic source in El Encinal is agriculture, primarily consisting of cultivating basic grains, plantains, and coffee.

View from a home in El Encinal

Access

El Encinal can be accessed by the highway that connects the city of Tegucigalpa to the municipality of San Juan de Flores. The route begins as 55 kilometers of paved road until Compania Azucarera Tres Valles and is then a dirt road for another 25 kilometers to El Encinal. The road conditions are fair, but four-wheel drive is often needed during rainy seasons.

Public Services

The following public services are offered in El Encinal: an elementary school, a kindergarten, a church, cellular telephones, and latrines, pilas, concrete floors, and eco-stoves (implemented by Public Health Brigades).

Typical latrine in El Encinal

Population

There are a total of approximately 45 houses in El Encinal, including all houses that are inhabited, uninhabited, and in construction. The total population including men, women, and children is approximately 280. Population data was used in order to calculate the future population for the design of the water system.

Background

The community of El Encinal was relying on a drinking water supply system that did not meet all of the adequate conditions of a correctly working system in terms of water quality and quantity. The previously existing water system was constructed 25 years ago by the Honduran government institution called Project ALA 86/20. No monitoring or follow up was provided by this institution after construction. The original system was constructed to supply a total of 50 households distributed to the two communities of El Encinal and El Junco without taking into

Typical pila (water storage unit) in a home in El Encinal

account the growth of these communities. Presently, these communities have a total of approximately 80 inhabited households, about 10 uninhabited households, two schools, two kindergartens, and one health center relying on the water system. Houses which were not originally connected to the system or located at an elevation above the original storage tank were not connected to the system and were forced to get water by carrying it from a nearby stream. Pipe diameters in the original system design were not sufficient to provide water consistently to all of the houses that were connected. In many cases houses could go without receiving water for up to a week.

The Water Council had only two members who were not complying with any of their responsibilities. Due to lack of organization in the water council and poor water service the vast majority of community members were not paying a water fee. This lack of organization and general infrastructural failure caused the community to stop treating its water. Illnesses related to water and poor sanitation and hygiene were common. As a very under resourced community, El Encinal did not have the funds to improve their existing system, or to consider constructing a new system. The community had previously solicited support from government organizations without receiving any help. Water Brigades came to an agreement with the community of El Encinal and El Junco to assist in the reconstruction of their potable water system.

SYSTEM DIAGNOSTIC

Water Brigades visited the community of El Encinal many times throughout 2009. The purpose of these visits was to complete a diagnostic of the previously existing system to determine all existing problems. The following was found:

- The system was 25 years old and was only serving a portion of the homes in the community. Houses without water connections were either without water, were gathering water from streams or other sources, or were getting water from their neighbors when possible.
- The dam at the water source was a simple concrete wall and there were suspected losses due to the porous geology where dam side walls had not been built.
- During the rainy season sediment loads in the water source caused problems with the intake structure at the dam. The lack of cleaning and air valves in the conduction line prevented the community from being able to properly clean and maintain the system causing sediment to collect in the piping.

Visiting the dam as part of the system diagnostic

- 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. Unprotected valves were being manipulated by unauthorized community members leaving sections of the community without water.
- The diameter of the piping in the conduction line (pipeline between the tank and dam) was a combination of 1 ½" and 1" piping, not a sufficient diameter to provide water to the population.
- Flow entering the storage tank was measured as under 12 gallons/minute (gpm), less than half of the flow necessary to provide all 80 houses in El Encinal and El Junco with the recommended minimum of 25 gallons/person/day.
- Broken and leaking pipes and household connections were causing constant water losses.
- Various pressure break tanks were found with faulty float valves causing pressure and flow losses.
- There were eight houses constructed at a higher elevation than that of the storage tank preventing those houses from being able to receive water from the system.

12 gpm entering the original storage tank in El Encinal

- The Water Council consisted of only two members, the president and the treasurer, of the required seven. However, their participation was minimal and they had not received proper training. The Water Council 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 observations it was determined that almost all community members had stopped paying their monthly water fee.

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 prior to executing the project in order to plan and design a new water system. They also worked to ensure that there would be a high level of understanding and collaboration during implementation. The pre-implementation process can be broken down into two phases:

Planning & Design

- It was determined that the best solution to the water problems in El Encinal and El Junco was to separate the communities so that each would have its own water system. El Encinal, being the higher community, would continue to use the original water source and a new source would be identified for El Junco.

Taking a GPS reading at an existing pressure break tank

- A preliminary GPS study was performed to identify a potential new storage tank site and conduction line route.
- A detailed study of the previously existing distribution network was performed with the support of community members where all houses were visited and mapped.
- A topographical study was performed to:
    - Verify the new storage tank location and elevation. It was ensured that it was below the dam site and above the eight houses which were previously not served by the system due to their elevation.
    - Design the exact route of the conduction line to the new storage tank site.
    - Design the new distribution network including all previously unconnected houses.

Topographical study in El Encinal

- Using the topographical study, the conduction line and distribution network were designed by student volunteers from Marquette University.
- 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.

Community Organization & Documentation

- An agreement was reached with the community that a reconstruction of their water system was the best solution to their water related problems.
- It was determined that the project would be completed in two stages.
- The community was presented with the methodology of Water Brigades.
- A full 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.
- A Contract of Construction and Cooperation was established outlining the responsibilities of both Water Brigades and the community of El Encinal.
- All right of ways were obtained for new piping which was to cross private property.
- The work requirement for each home in El Encinal was determined so that each home could retain or obtain its household water connection.

Meeting of the Basic Sanitation Committee of El Encinal and El Junco

- 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 completed in August 2009 with Water Brigades groups from UC Berkeley & Loyola University Chicago. The following aspects of the project were worked on during Stage I: the water source and dam, the conduction line, a system test, educational seminars, and Water Council training.

Water Source & Dam

PVC filter installed at the dam site

Work at the water source began with removing all sediment that had built up in the dam reservoir and system intake structure. While the site was prepared for construction, community members carried all cement, sand, rocks, gravel, rebar, and necessary tools from the community to the dam site. Concrete walls were built and a simple PVC, rock, and gravel filter was installed and connected to the intake structure to lower sediment loads in the system.

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. GI pipe was installed on rocky terrain or for stream or gorge crossings. Over 650 meters of trench were dug by community members and student volunteers. Students and community members installed various lengths of 2" diameter GI pipe acting as the exit piping from the dam. Concrete anchors were constructed to sustain the GI portion of the piping. Where trenches began, 2" PVC pipe was installed until reaching the site of the new storage tank.

Student volunteers isntalling PVC piping

In addition to the piping, 4 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.
- 2 Cleaning Valves: installed at low points of the conduction line, allowing for any sediment that does manage to get into the pipeline to be flushed out.
- 1 Air Valve: installed at a high point of the conduction line, allowing for any air that has built up in the pipeline to be released.

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

System Test

Once the conduction line was complete, it 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 arrived successfully at the new storage tank site at a rate of 21 gallons per minute, while the community only requires 12 gallons per minute in order to provide the required 25 gallons/person/day.

Educational Seminars

Brigade groups executed a series of educational seminars throughout the first stage of implementation in El Encinal. Seminars were directed at children, women, and families. Through various educational methods (skits, games, visual aids, etc.) the following topics were covered:

- Watershed protection
- Water conservation
- Water and illness
- Water treatment
- Sanitation
- Hygiene
- Hand washing

Student volunteers performing their educational seminar in the local school

Water Council Training

In the weeks following the system test Water Brigades staff partially trained the seven-member Water Council of El Encinal. 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

IMPLEMENTATION: Stage II

Stage II of project implementation was done throughout May and June 2010 with Water Brigades groups from Boston University, Emory University, UC Berkeley, UT Arlington, Stony Brook University, Arizona State University, Chapman University, University of Chicago, UC Santa Cruz, DePaul University, and Oregon State University. The following aspects of the project were worked on during Stage II: storage tank construction, distribution network, domestic connections, educational seminars, Water Council training and Basic Sanitation Committee training.

Storage Tank Construction

Construction of the new storage tank

A 5,000 gallon steel reinforced concrete storage tank was constructed. To create a level construction site the necessary groundwork was performed before the foundation could be laid. A chlorination tank was constructed on top of the storage tank so that the members of El Encinal will be able to properly treat their water. All necessary valves and connections were installed including: inlet valve, outlet valve, cleaning valve, and overflow pipe.

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 sectors and domestic connections. Over 3,000 meters of trench were dug by student volunteers and community members. PVC and GI pipe of the following diameters was installed: 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.

Student volunteers burying recently installed PVC pipe

Household Connections

New household connections were fabricated using GI pipe and faucets. Connections were installed in all houses including those without a previous connection. Once completed, 100% of the houses in El Encinal were connected to the water system.

Educational Seminars

During the second stage of implementation in El Encinal brigade groups executed a series of educational seminars directed at children. Through various educational methods (skits, games, visual aids, etc.) the following topics were covered:

- Watershed Protection
- Water conservation
- Water and illness
- Water treatment
- Sanitation
- Hygiene
- Hand washing

Students particpate in community clean up as part of their education activity

Basic Sanitation Committee Training

The Basic Sanitation Committee (Comité de Saneamiento Básico) in El Encinal 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: household water storage, latrine maintenance, household cleanliness, and personal hygiene.

Water Council Training

In the weeks following project completion Water Brigades staff finished training the seven-member Water Council of El Encinal. The community plumber also completed training.

PROJECT SUMMARY

The El Encinal water project was a great success for the community, Water Brigades, and all brigade groups who were involved in the project. With the construction of two separate water systems for El Encinal and El Junco, El Encinal will be able to continue to use the original water source which, combined with the new piping and tank, will provide enough water for the entire community. The members of El Encinal will no longer go days without sufficient quantity and quality of water.

Completed storage tank

The following project components were completed:

- The dam and intake infrastructure were repaired and improved and a filter was installed.
- A completely new conduction line was installed.
- All necessary cleaning, air release, and control valves were installed.
- A 5,000 gallon storage tank and chlorinator were constructed.
- The entire distribution network was redesigned and constructed.
- All houses received were connected to the new system.
- The 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.
- A flow rate of over 20 gpm entering the tank was achieved, almost double the quantity of water that the community needs.

Water turned on for the first time in the new system at the El Encinal school

When Water Brigades first entered the community of El Encinal a dire water need was observed. Furthermore, the community lacked strong leadership, organization, and motivation due to having lived so many years without a proper water system and no government support. An enormous success was working with and eventually seeing the change in community organization and buy-in to their water system.