Document 901B
PROGRAM IMPACT MONITORING REPORT

CHAPTER: Worcester Polytechnic Institute
COUNTRY: Guatemala
COMMUNITY: Guachtuq

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February 15, 2015

ENGINEERS WITHOUT BORDERS-USA
www.ewb-usa.org

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1.0 INTRODUCTION

1.1 Contact Information and Reporting History

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Program Title	Guachtuq Water Supply
Community	Guachtuq
Country	Guatemala
Date of 502 Approval	N/A
# of Months Since Last Site Visit	6
Date of Baseline Study Report (901)	July 20, 2014
Date of This Program Impact Monitoring Report (901B)	February 15, 2015

1.2 Program Summary

The Engineers Without Borders chapter at Worcester Polytechnic Institute aims to provide the community of Guachtuq, Guatemala with a sustainable, year round water security: adequate quantity, quality, and access to water to meet needs. Guachtuq is located in the Alta Verapaz region of Guatemala and is home to approximately 200 people in 36 families. Of the many problems they face daily, the absence of clean drinking water is the greatest concern. In the Guachtuq Water Supply project. EWB-USA WPI focuses directly on the water problem, and works with the community to learn more about environmental and social issues that affect their health and water security.

Currently, EWB-USA WPI maintains excellent contact with El Centro Communitario Educativo Pokomchi (CeCEP) an NGO that works to preserve and educate the Pokomchi community in the region and improve the quality of life for those in need. Sucely Ical Lem (Sucy) and CeCEP volunteers help coordinate travel and homestay logistics, translators, and monitoring. Alvaro Cal Lopez, one of the volunteers, is employed by EWB-USA WPI to visit families in Guachtuq on a monthly basis and collect monitoring data, even when the club is not in country. Through CeCEP, EWB-USA WPI has also made connections with the San Cristobal Municipality, who

has supported the project with transportation of materials to Guachtuq and thinks highly of the work the team is doing.

Current PMEL Lead Katie Picchione underwent PMEL training at the 2013 Northeast Regional Conference. She is majoring in the social sciences and has worked closely with Faculty Advisor Laureen Elgert, Ph. D., to learn about research and evaluation methods, indicators, and interviewing practices. Picchione and Elgert spearheaded community interviews in 2014, gathering information to identify indicators of project success.

2.0 PROGRAM IMPACT MONITORING

2.1 Update on Current Community Context

- The team has observed changes in the economic conditions of the community at homes where EWB-USA WPI has constructed a rainwater harvesting system. It has been observed that at these homes, it is much more likely that the mother, or even grandmother has been able to find employment using the time that they save by reducing the number of trips to get water from the finca. This additional employment makes it so that the husband is no longer the sole breadwinner of the family, thus increasing the family's economic self-sufficiency.
- The power structures within the community have remained the same. The main committees in charge remain the COCODE, the community government that communicates with the local municipality, the women's committee, who has been less active in the past year, and the water committee. Elections for positions in the COCODE recently occurred, and while it is normally a male dominated group, a woman, Elidia Xona Yuja (House 26) in the community was elected to the Vice President position in the committee. It is noteworthy that Elidia is the wife of Roberto, the Vice President of the Water Committee. They were recipients of a pilot system in January 2013.
- There are no new cultural or social issues to report regarding Guachtuq. The only perceivable social change is the community not always understanding why some homes receive a different amount of tanks than others. This is something that through ongoing education about EWB-USA WPI's design process and Excel model, the team hopes to correct. However, previous projects in the community were tank projects, not system projects, which is where they draw this common misconception from.
- There are no other organizations working with the community that EWB-USA WPI is aware of.
- The travelers on this past trip observed that the implementation of systems also made it possible for children to more consistently attend

school because they did not have to spend as much time assisting their family with retrieving water from the finca or washing clothes there.

2.2 Update on Community-Identified Problems to Address

- The finca remains an unreliable and unsafe resource for drinking water. It provides an insufficient quantity of water during the dry season, is not of potable quality, and is not reliably accessible since community members do not own it. This has been shown through interviews in the community that cite the finca running dry at multiple points during the year, and that there are constant threats to shut off the water source. Also this has been proven through continued water quality tests that EWB-USA WPI completes on each trip.
- No new water sources have become available to the community, and no work has been done on the finca to reduce the amount of pathogenic contamination. The volume of water available to the community is dependent upon the flow from an unprotected spring located on private property upstream. With this lack of change to the structure, the situation regarding the quantity of water available to the community has not changed with exception to homes that have EWB-USA WPI implemented systems.
- No changes have been made to the finca basin that would improve the quality of water available to the community. Since it is an open basin, it is very easy for any debris or organic matter to get into the water and thrive in the basin. In addition, the tap on the side of the basin has no way of being cleaned; therefore, with stagnant water sitting in it at nearly all times and being an open system, the water is unable to be any cleaner than its current state. From repeated water quality tests that EWB-USA WPI has taken from the basin and the tap, it has been shown that the water still contains high levels of bacteria and pathogenic E.coli.
- Access to water in the community has been maintained, and has slightly improved. This is due to decreased tensions between community members and the owner of the land where the finca basin draws from. However, the distance to the finca and overcrowding at the basin has not improved, maintaining multiple barriers to access that have always existed.

2.3 Update on Change Areas

Change Area	Update on Changes from Baseline Study or Last Program Impact Monitoring Report
Change in public health	*Through monitoring interviews with families who have received EWB-USA WPI systems, some families have experienced slightly less sickness, but the systems have not been in place long enough to have a definitive change here.*
	This solves one of the main concerns of having a polluted water supply. Improved health and quality of living is one of the effects that EWB-USA WPI hopes to have on the community with this project.
	The cleaner water that community members are able to get out of their rainwater harvesting systems is able to provide them with clean drinking and cooking water, making what they consume healthier and cleaner.
	n/a
Change in environmental health	*There have been no changes in environmental health.*
	n/a
	n/a
	There is no change to environmental health because these systems are designed to have minimal impact on the surrounding environment and are placed in locations such that the concrete bases do not have an effect on surface runoff.
Change in behavior	*Community members have begun to maintain their systems as a whole; they are not just worrying about cleaning their tanks, but are focusing on the other areas as well. Through monitoring interviews, the team learned that each family has been cleaning the gutters, emptying the first flush, and most were observed to have been cleaning the filters.*
	The importance of this change is that the community now sees rainwater harvesting as a system, instead of a tank concept. This shows knowledge transfer from the club to the community not only about specifically the EWB-USA WPI systems, but about water safety in general.
	Education booklets and training that was conducted with each of the families who received a system played a role in this. In addition, on the January 2015 trip, learning sessions were conducted with the children to reinforce this idea as well. In addition, every family had the education booklets on hand, still in the plastic bags they came in.

	n/a
Change in access to services (water)	*The families that have received EWB-USA WPI systems have much greater access to water than they did in the past because the systems are located at their homes. This is a sharp contrast from the average half hour walk one way to the finca basin, located down the mountain from the community.*
	This is a huge change, as reflected in monitoring interviews because women and children no longer obtain drinking and cooking water from the finca during the rainy season. This gives the women and children much more free time than they previously had. For the women, both the wives and grandmothers of the households, this enables them to find jobs. Many homes were able to gain an additional financial provider.
	The biggest piece that contributes to this change is the location of the tanks.
	n/a
Changes in technical knowledge related to projects	*During the implementation in May 2014, the team taught approximately 20 community members (men and friends of eight homes) the intricacies of constructing an EWB-USA WPI rainwater harvesting system. This knowledge transfer was demonstrated in the fact that the community was able to take apart, move, and reconstruct a system entirely on their own. This took place at House 27, the home of Cristobal Coy Max who moved within the community, and with the help of other community members was able to move the system without even notifying EWB-USA WPI.*
	This change is significant because it is one of the main factors that led the club to pursue a 24 home implementation in May 2015. This display of knowledge transfer shows that the community is able to build the systems on their own. This is important because the more the community members know, the faster the construction is able to go.
	More extensive and complete knowledge transfer during the May 2014 implementation contributed most heavily to this change. In addition, the amount of community members involved with the May 2014 implementation made this possible as well.
	n/a
Change in community organization	*One change in community organization occurred during elections the community regularly holds for the main governing body of the community, the COCODE. EWB-USA WPI was made aware of the new community members in each of the*

	positions, and was surprised to learn that one of the women in the community is now serving as Vice President in a previously male dominated arena.
	This change from a male-only body to including a woman in the committee is a large change for a community that is often set in more traditional ways.
	The woman is the wife at the home of a pilot system, and of one of the most helpful community members. EWB-USA WPI is unsure if this had any bearing on the election, but is aware that the project may have changed the family's status in the community.
	n/a
Change in Community self-advocacy	*No changes have been observed by EWB-USA WPI*
	n/a
	n/a
	No changes have been made since EWB-USA WPI is not representing the community to any other governing body, and the community is able to represent itself when the team is in country, and also through the Water Committee and CeCEP.

2.4 Previously Identified Barriers to Program Success (up to 3)

The 3 previously identified barriers to program success are:

1) Availability of Materials: The availability of materials proved to be less of a barrier than anticipated as the travelers were able to receive quotes for various materials from 3 different construction stores located within a half hour radius of San Cristobal, the municipality that neighbors the community.

2) Community Involvement: Through community meetings and learning sessions with the children, the community remained incredibly involved with the project even through this assessment trip where no community members were required to take time off of work.

3) Fundraising: On this trip, the final steps were taken to secure a large grant that will be able to fund the upcoming implementation trip in May 2015.

2.5 Previously Identified Facilitators of Program Success (up to 3)

The 3 previously identified facilitators of program success are:

1) CeCEP: CeCEP is an incredible asset that EWB-USA WPI is fortunate to have in country. They have continued to be invaluable in the monitoring and planning of this project. Alvaro, a volunteer at CeCEP, continues monitoring the previously constructed systems while the team is not in country. In addition, Alvaro also oversees the purchase of all of the materials for the project before the team arrives in country so that the materials stores have time to accrue the quantity needed for that specific trip. In addition to serving as translators, Abelino Cal and Sucy Ical Lem, two other members of CeCEP, are key players also prove to be crucial when it comes to both community relations and connections in the San Cristobal municipality.

2) Municipality: The San Cristobal Municipality has also been helpful by offering again to assist with the transportation of materials from Coban and to Guachtuq. The mayor has thanked EWB-USA WPI for the work the team does and supports continuation of such projects in the area.

3) Roberto: One of the most valuable members of the in-country team, Roberto Chocoi keeps track of tools and materials for the team, serves as a translator when needed, and gives his time freely. He is an excellent organizer and a rising expert on rainwater harvesting systems. He has demonstrated this by assisting Alvaro with the monitoring of the systems and has helped educate the community on them by assisting with replacing broken mosquito netting in the systems while EWB-USA WPI was not in country.

2.6 Potential Barriers to Program Success (up to 3)

1) Materials Transportation: With the upcoming implementation being so large, it will be difficult to keep track of all of the individual materials for each system. The club is taking multiple different steps to mitigate this issue including staggering materials transport, leaving extra time to sort the materials after they arrive, and training community members on the system designs in order to be able to better include them on this part of the process.

2) Community Involvement: Although it is likely that the community members will be willing to assist with the implementation of systems, their participation is crucial in ensuring the success of this project. To date, they have signed MOUs with EWB-USA WPI which indicate that each home will assist in implementations. Nevertheless, it is important to note the levity that their participation carries.

2.7 Potential Facilitators of Program Success (up to 3)

1) CeCEP: CeCEP is integral in planning for the upcoming implementation. They play a key role in developing relationships with new construction stores and transportation companies that will make the May implementation trip run smoothly. They also assist EWB-USA WPI by holding a pre-trip meeting with the planned beneficiaries in the community before the travelers arrive in country to go over the expected preparations and commitment again.

2) Community Involvement: It has been shown over the past few trips that the community is incredibly invested in the project and is willing to put in the time and effort to make it happen successfully. This has been shown through their willingness to take off work to complete the project, or their commitment to finding a different representative if they are not able. They have also shown a great knowledge of the system as described in section 2.3 when they reconstructed a system without the assistance or guidance of EWB-USA WPI.

3) Cooperation of Municipality and Don Julio: Two important authorities in the area, both of them help support this project. The municipality continues to volunteer its trucks for the transportation of materials and their water truck for water to be used for concrete bases. Don Julio, the manager of the land that the finca basin feeds from, also opens his access road to the community, a preferred route for the trucks when delivering materials and tanks to the community. Without support from both these places, the implementations would be much more difficult.

2.8 Analysis of Current Results

Analysis Question	Current Results
To what extent is the program achieving and influencing the planned changes or stated community goals?	From the monitoring completed on the last trip in January 2015, it has been shown that the EWB-USA WPI rainwater harvesting systems are improving water security for the families in the community. It has been able to improve quantity by adding storage capacity, enough for their drinking and cooking needs according to our calculations and reinforced by observations. It also improves the quality of water, with tests that the team completes showing that there is no E. coli present and minimal coliform bacteria present in the EWB-USA WPI systems. This is a stark contrast to

	the finca basin which is highly contaminated. Lastly, they have improved access because the systems are on their property which alleviates the original need to spend up to six hours a day collecting water.
Where is the program failing to influence the planned changes or stated community goals, and why?	The club has yet to implement on the remaining 22 homes in the community, the systems implemented by EWB-USA WPI are not failing.
Are there any negative and or unexpected changes that have resulted from the program implementation? If so, what are they and why did they happen?	At multiple homes in the community, families have opted against receiving systems because they do not add any additional tanks to the systems that the families already have. This stems from the normal kind of rainwater harvesting projects completed in this community, where the sponsoring organization only focuses on tanks and not the whole system. Unfortunately, although a system upgrade with new gutters, piping, and first flush that utilize more roof area would help, there are two families in the community who chose to not receive anything. Another unexpected change was that another home denied a system on the grounds of fearing their landlord was about to kick them off their land. There are multiple conditions in the MOUs signed with each of the families that prevent against this kind of action, however, it was not enough to convince the family to participate in the program. An unexpected change occurred when the family in House 41 moved out of the community. This occurred while EWB-USA WPI was out of the community, and was revealed to them shortly before traveling in January 2015. The club learned it was the result of a divorce. The home was taken down and the family was therefore taken out of the program.
Considering all parties involved in the	For the first change, the chapter's contribution

program, how would you describe your chapter's contribution to the planned/unexpected changes? (Very significant, quite significant, not significant)	was not significant, as the club has been upfront with the community from the beginning of the program regarding how the number of tanks is determined. In addition, the team has been clear to each individual family the amount of tanks they will receive from the first time their home was assessed. For the second change, the chapter's contribution is quite significant with the possibility of being very significant. Although it did appear that this threat of eviction was present before the solidification of the system design, it is possible that one of the reasons the family was possibly facing eviction was so that the landlord could take the system.

2.9 Current Results

Analysis Question	Current Results
What can your team and EWB-USA headquarters learn from these findings?	From this past trip, the team pulled away multiple important lessons. Be sure not to underestimate the capabilities and passion of the community. This community in Guachtuq is passionate about this project and ready to do nearly everything that they can to help with the construction and maintenance of their systems. This was also seen through the reconstruction of the system at the house of Cristobal Coy Max. The team also learned while in country, once again, how crucial it is to have an NGO that is willing to work with you both while you are in country and out of the country. CeCEP has always played a major role in the project, and since they take care of much of the preparatory work for the club before the travelers arrive, it makes each trip flow much easier.
How should the program adapt as a result of the current findings?	The program is adapting due to these lessons by again planning learning sessions for this May trip. However, in order to be sure that the team does not appear condescending, the content of the lessons will be shifted to more complex and detailed maintenance and construction since it is clear the community has the basics covered. In addition, the program will continue to adapt in order to accommodate this large upcoming implementation. With this large change in scope comes a change in process and time management. The January 2015 trip was able to lay all of the stepping stones for this adaptation to happen, and the change in the program and the organization has already begun.

3.0 APPENDIX A – PROGRAM LOGICAL FRAMEWORK (Document 905)

Program summary	**Objectively verifiable indicators**	**Means of verification**	**Assumptions**
Overall Goal: Achieve and spread sustainable water security	Measures (direct or indirect) the program's contribution to the goal Number of people or families who rely on the finca	Sources of information and methods used to show your contribution to meeting the goal Interviews Census Surveys	Important events, conditions or decisions beyond the program's control, which are necessary for maintaining progress towards the goal Development of local skills Existence of entrepreneurial spirit Water committee leader present in the community Community members understand importance of entire system maintenance
Specific Objective: what the team intends to change during the program period (Outcome) Change the way community members use, perceive, and obtain water.	Measures (direct or indirect) that the intended change has occurred and is sustainable Observed method of community members handling and transportation of water, as well as the storage of water. Existence of broken components Observed evidence of routine maintenance on the system done accurately without EWB-USA WPI.	Sources of information and methods used to show that change has occurred Interviews Monitoring surveys Photo documentation Water quality tests Monitoring of system maintenance through observation by Alvaro and the travelers	Assumptions about *external factors* that need to be in place if the program is to contribute to the overall goal Educational materials are effective Each component must be in full working order for the system to function properly Families have the financial ability to maintain systems Community member's jobs are stable to provide the income necessary to maintain the systems. Community values the technology the they receive
Expected Results: the results which should be within the control of the program (Outputs) Increase amount of water available to each family Improve each family's control over water and therefore their access to it	Measures (direct or indirect) that the expected results of the program have been achieved Quantity of water available to each household during dry and wet seasons. Time to collect water (amount of trips needed to be taken to the finca basin)	Sources of information and methods used to periodically review results Alvaro's monitoring trips to the community Interviews Surveys	Assumptions about *external factors* that might affect whether the specific objective/outcome is achieved Each component of the system (first flush, overflow, etc.) effectively improves water quality and quantity as designed. Guatemalan climate can support year-round rainwater harvesting systems. The families in the community want to receive systems.

Improved water quality from tanks available to the families of the community Reduced reliance on the finca	Quality of the water at water point	Water quality tests Monitoring of finca use	The municipality continues to offer support that enables this project. Finca basin remains open and available to community Families have enough time and financial security to initially construct and maintain the systems.
Activities: the things which have to be done by the program to produce the outputs Calculate amount of water storage needed and design the system with the required amount of tanks to achieve this. Build rainwater harvesting systems at each home, Water quality testing Produce educational materials to instruct families about system maintenance, boiling water, etc., Transfer money to Guatemala for implementation and monitoring costs	The inputs and resources needed to carry out each task Use of the Excel Model- rain data, area of roofs, number of tanks, consumption rate for each family Use local materials, suppliers, the water committee, community labor, municipality transportation, and CeCEP's support to facilitate construction. Identify and order water tests Identify rhetorical images and graphics, learn about what images will convey ideas (cultural context), create durable education booklets. Western union is available and Sucy maintains a bank account and follows up with community members and Alvaro for money distribution	Proof that each activity/task has been completed Homes at which systems have been implemented using the Excel model have enough water throughout the year Every family has a rainwater harvesting system that provides adequate water security year round Results of water quality tests Distribution of educational materials with every system implemented Provided CeCEP with electronic copies to produce more copies if necessary Everyone pays for their systems and proper participants are paid	• Assumptions about *external factors* that might affect activities achieving the expected results • Preconditions that need to be fulfilled before the program can start Students have enough knowledge to create, maintain and update a working excel model. WPI students can safely travel to Guatemala . Families can afford systems as designed. Students can collect and analyze meaningful water quality data. Tests are available and financially viable. Rhetorical images exist to communicate ideas across a cultural and language barrier. The community already has an idea about these concepts and is willing to adapt and expand their knowledge base. EWB-USA WPI has adequate funds to support the project Sucy and CeCEP remain a reliable and trustworthy contact.