

Guatemala Report:

The Return on Investment for Water Projects in Quiché

Marquette University
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Abstract: This report outlines and analyzes the social and economic impact of implementing potable water systems in Xabillaguach, La Puerta and Lacama I, Chichicastenango in Quiché, Guatemala as well as the desire for entrepreneurship from San Andres Sajcabajá in Quiché, Guatemala, a community post-potable water implementation.



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Introduction

Marquette University Applied Global Business Learning (AGBL) offers students an exceptional volunteer experience which aims to aid communities in developing nations. AGBL does this by providing micro-enterprise solutions; it is the hope of the program to foster sustainable business practices while preserving cultural ideals.

In 2010, an AGBL team visited the community of Patzalá in San Antonio Ilotenanagno, Quiché, Guatemala to analyze the economic costs and benefits of the implementation of potable water systems. Guatemala, a country with ample water resources, but no national water system regulating the distribution or quality of the water, uses less than 70% of its basic water requirements.¹ This is because many families must walk up to 15 kilometers to the nearest water source² and the fact that 98% of Guatemala's water is contaminated.³ Consequently, much time is spent traveling to obtain water and much illness results from poor water quality. Through the implementation of potable water systems and filters, however, communities can have access to clean water in their homes, thereby saving both time and money. The 2010 AGBL team concluded that benefits outweighed the costs for potable water systems and their report has helped many communities obtain the necessary funds to initiate a water project. However, many communities are still in need of water.

Thus, in January of 2013, another AGBL team visited Guatemala to further investigate the financial and health costs and benefits of potable water systems as well as explore entrepreneurship as the next step toward economic growth and stability. This AGBL team visited the communities of Xabillaguach, Lacama I, and La Puerta in Chichicastenago, Quiché, Guatemala and gathered data through an interview at a community meeting at each site. These results gave the AGBL team a basis to comprehend the economic and health impacts of access to clean water on these communities.

This report outlines the conclusions drawn from the 2013 AGBL team's observations. To begin, Xabillaguach, La Puerta and Lacama I are nearly identical communities in regards to demographic, economy and daily life save for one major difference; Lacama I has access to clean water while Xabillaguach and La Puerta do not. Furthermore, women in all the communities perform similar daily tasks yet Lacama I and La Puerta spend drastically less time on these tasks due to the implementation of potable water. Therefore, it is pertinent to assess the overall contributions of these women to their

¹ US Army Corps of Engineers, 2000.

² Applied Global Business Learning Guatemala 2010.

³ Braghetta, 2006.

respective households based on their additional free time. Moreover, this report analyzes the economic impact of establishing a water project to create access to clean water. As such, the AGBL team led an entrepreneurship seminar in San Andres, a community with access to clean water for over twenty years, to better understand the needs of a community after receiving access to clean water. Overall, this report offers an understanding of the impact of access to clean water on Xabillaguach, La Puerta and Lacama I in regards to women's daily tasks and the overall economic impact as well as the desire for entrepreneurship for a community, San Andres, post-access to clean water.

Commonalities

This report draws information gathered from three towns visited during the 2013 AGBL trip to Guatemala where one of these towns, Xabillaguach, did not have access to clean water, another, Lacama I, did have access to clean water and the final, La Puerta, had access to water without a filter. Access to clean water is defined as filtered water reaching the faucets in one's home through the implementation of a potable water system. Generally, these towns share many commonalities which make them ideal for analysis of impact of access to clean water. To begin, both Xabillaguach and Lacama I have a population of 200 individuals broken down as 33 families in Xabillaguach and 41 families in Lacama I, while La Puerta stands out with 140 families contributing to a total population close to 800 people. Individuals of Xabillaguach must travel 30 minutes one way to fetch clean water from a local water source in the form of a spring. Similarly, prior to receiving clean water in their homes, members of Lacama I and La Puerta⁴ traveled 40-50 minutes one way to acquire clean water from their local well. Water in all communities is typically used for bathing, laundry and consumption which will be discussed later on. Moreover all communities participate in a subsistence farming economy which is not sufficient to provide a living. Thus members of each community describe a good month's work as about the same number of days per month, 15-20 days. A poor month's work for both communities is only 10 days. Members of Xabillaguach and Lacama I earn about 40 quetzals a day, equivalent to about \$5.26 a day, for an 8-10 hour work day. On the other hand, members of La Puerta earned 50 quetzals a day which is equivalent to \$6.58 a day.

Furthermore, Xabillaguach and Lacama I provide schooling from 1st to 6th grade. Xabillaguach offers a school with 4 teachers for 95 students while Lacama I offers 6 teachers for 150-180 students. Interestingly, few students from either community receive a greater education than 6th grade since

⁴ Only two families in La Puerta do not have access to water in their homes therefore they still travel the distance to collect water.

parents from both communities do not earn enough money to send their kids to the city for greater education. Both communities describe the cost of education as around 300 quetzals a month for books and the costs continue to increase as their child increases in grade level. In contrast, La Puerta's school (1st-6th grade) includes 8 teachers for 251 students. They also offer three years of junior high, but only have 35 students. In addition, children in La Puerta often miss school as a result of unclean water related illness which can impact their education. According to the families of Xabillaguach and La Puerta, the children are frequently unable to attend school since they are constantly sick due to unsafe drinking water. According to the teachers in La Puerta, children typically miss one week of school per month. Moreover Lacama I used to deal with a similar issue prior to the implementation of potable water systems; since then the number of times the children become ill has decreased significantly.

Men in Xabillaguach and La Puerta also often become sick which results in missed days of work. Although the men do not become sick as frequently as the children, they become sick relatively often. Members of Xabillaguach quantify work days missed as a result of water sickness to be 7-10 days a month. La Puerta reports adults falling ill about 4 times a year. Men in Lacama I have experienced a decrease in the number of sick days, about once a month, since receiving access to clean water. It is important to note the impact of men missing work due to sickness from unsanitary water results in loss of income. Consequently, children often have to abandon their studies to work. For instance, in La Puerta, class size significantly decreases as grade level increases: a starting class of 230 students in 1st grade in La Puerta typically results in only 15 making it to 6th grade. Overall, these towns share common demographics, economy, and daily life. As such, Lacama I offers a lens to view the impact of access to clean water on the members of Xabillaguach and La Puerta as well as the extent of the impact of access to clean water on a community as a whole.

Health Implications

However, it is important to note that when children are not visibly sick with an acute illness, they are likely still suffering from malnutrition, a disease-promoting condition resulting from imbalanced and often inadequate intake of nutrients that is more detrimental to their education and health than any acute illness. Numerous studies in Latin America, Africa and the United States have shown that children with a history of malnutrition score lower on intelligence tests than their properly nourished peers with similar socioeconomic status. Among individuals with more than two years of formal education, those with proper nutrition tend to score twice as high as those suffering malnutrition, indicating that poor

nutrition can negate the benefits of schooling.⁵ These findings highlight the importance of nutrition because without proper nutrition children cannot reach their full potential academically even if they never miss a class. This later limits occupational opportunities and hinders workplace productivity. Therefore, it is crucial that the necessary steps be taken to ensure proper nutrition and the implementation of potable water systems is an important first step.

According to the World Health Organization, there is no single type of intervention that has a greater overall effect on health than providing safe drinking water and proper disposal of human excreta.⁶ Additionally, the prevalence of malnutrition worldwide in homes that lack safe drinking water is twice that of homes with potable water systems.⁷ Without safe drinking water, children are exposed to a myriad of waterborne pathogens that cause enteric infections resulting in malabsorption of nutrients and increased loss of nutrients through diarrhea, thereby causing malnutrition. However, waterborne illness and malnutrition have a reciprocal relationship; not only do waterborne illnesses promote malnutrition, but also, malnutrition increases the likelihood of infection because malnutrition weakens the immune system. For example, a malnourished child has a 53% higher risk of contracting pneumonia, a 61% higher risk for diarrheal infections, a 57% higher risk for malaria, and a 45% higher risk for measles compared to their peers receiving proper nutrition.⁸ Thus, for children living in poverty without access to clean water, a vicious cycle of malnutrition and illness exists.

Daily Life of Women

The daily life of women tends to be very similar between the communities of Xabillaguach, La Puerta and Lacama I. Most of their days are spent weaving, cooking, cleaning, doing laundry and caring for the children. Unfortunately, when comparing laundry and bathing a huge time gap becomes apparent. In the communities with potable water, Lacama I and La Puerta, they tend to spend about two hours a day washing clothes. In the community without a potable water system, Xabillaguach, the women must walk to the well (about 30 minutes each way) and are not able to do laundry every day. They must dedicate a half day, 4-5 times a week going to the well just to clean clothes. This is a huge time commitment, especially for those with young children who must also accompany them to the well. The family members in Xabillaguach bathe about 2 times a week; sometimes only twice a month depending on

⁵ Brown and Pollit, 1996.

⁶ Braghetta, 2006.

⁷ Rodríguez-Martín, Novalbos-Ruíz and Jiménez-Rodríguez, 2010.

⁸ Rodríguez-Martín, Novalbos-Ruíz and Jiménez-Rodríguez, 2010.

water scarcity. On the other hand, Lacama I members are able to bathe every day. Not only can the benefits of clean water be seen by comparing Xabillaguach, La Puerta and Lacama I, but also by comparing time spent performing common tasks before and after the implementation of a potable water system (see Table 1).

Table 1. Time Required for Women in Lacama I to Complete Common Tasks Before and After their Community Received a Potable Water System.⁹		
Common Task	Before potable water	After potable water
Prepare meals	1 hour each meal	1 hour each meal
To get water	40-60 minutes spent walking to the river each way	Now the water is in their home so the women use this time to weave. With additional time to weave they not only make blouses for the family, but sell them outside the community as well.
To bathe	The men would bathe in cold water and would get sick. Each person would bathe once a week because they had to walk to the river to get water.	Now the fire does not go out when the women leave to go get water and the family has time to heat the water and bathe daily with warm water in the temascal. ¹⁰
Caring for sick children	Children would get sick 10 times a month because they could not wash their hands. About 10 times a year per family, a child would require a trip to the doctor and prescriptions. The cost would be 500-600 quetzals in total for the sickness including the trip to the health center, the actual appointment and the medicine. Children would miss 2-3 days a week of school due to being sick.	Children get sick about once a month but it is less likely due to the water now (could be the flu or another infection). Now that children are not sick as often they can regularly attend school and have time to do their homework.
Clean the house	30 minutes	30 minutes
Do laundry	Every 3 days walked to the river to do laundry. 80-120 minutes total were spent traveling and an additional 2-3 hours were spent washing the clothes.	2 hours every day they can wash the clothes using the pila (the large sink) located right outside the home.
Additional notable changes mentioned	They report suffering due to lack of water, hunger, the necessity of walking to the river, and a lack of hygiene because even the floor was contaminated.	Now, they don't suffer these things and with clean water everything is more hygienic. They remember the exact date they got water – the 8 th of May 2012.

⁹ The potable water system had been in Lacama I for 8 months at the time of the interview.

¹⁰ A temascal, or sweat bath, is a dome-shaped adobe structure that has a firebox and a small entrance into the actual sweat bath, sometimes referred to as a sauna, that can fit several people inside. Dating from the ancient Aztecs and Mayas, temascals were and continue to be used for health purposes and cleanliness. In Lacama I, they heat water in buckets next to the fire and then enter the temascal to bathe using the heated water.

The data gathered by the AGBL team during community interviews, emphasizes the importance water plays especially in the lives of women living in the rural indigenous communities of Xabillaguach, La Puerta and Lacama I. After the implementation of potable water, the women of Lacama I were able to save up to 2-4 hours each day which they use to clean their homes and weave clothing to sell at the market. The presence of clean water has given women an opportunity to contribute financially for their families and has given children the chance to focus on their studies and get the most from their education. It is evident that clean water is essential for improving the quality of life of individuals, especially women and children, living in rural communities.

Working Women and Additional Income

As previously discussed, in Xabillaguach, the work of women consists of domestic household tasks such as fetching water, cooking, cleaning, washing clothes, and caring for their children. There is extremely limited free time, if any, for recreational tasks, mainly because these domestic household tasks consume the majority of their days' time. In addition to the basics, when their children are ill they are required to allocate a large portion of their time to travel for medical assistance, obtaining prescriptions, and providing additional care to their ill children.

In La Puerta, the community with potable water but no filters, the health situation is similar to that of Xabillaguach due to the poor water quality, but since the water is in the home, less time is required to complete the household chores. The women in La Puerta specialize in weaving braids that are used to make hats. Additionally, one women makes thread to sell.

In Lacama I, which has potable water, the daily tasks are consistent with those of Xabillaguach and La Puerta. However, there is a reduction in time spent caring for ill children. This extra time allows them to perform recreational tasks, such as weaving clothing, tablecloths, bags and other items to sell, that they once had little time for. The women that weave textiles, specifically blouses, reported being able to make 1-2 blouses every year. Each blouse takes approximately 1-3 months to complete and is sold for 200-300 quetzals. The new income provides assistance for families. When the men are out of work,¹¹ it is able to supplement for the lost income of the males.

¹¹ This community reported having an unemployment rate of 50%. Seasonal employment also limited the opportunities for men to have a steady income.

Based off these findings, the ABGL team believes that the implementation of potable water systems enables women to improve the financial and health situations of both their families and the community. First, women working outside the household would be economically beneficial to the community and each individual family. This could be accomplished if the women from the community came together to form a textile weaving company, or other companies that would utilize the natural resources and skills available to them.¹² If the women in the communities spent their free time weaving to create a bulk of merchandise to sell at the market or community shops, they could specialize in a particular product to market. The profits from the textile sales could be: 1) divided amongst the families; or 2) used to create a water savings account/fund to reduce the monthly cost they must spend on water and maintenance fees. Either way the family benefits financially due to an increase in income or a decrease in fees.

Second, with the time saved from no longer needing to travel to the local water source and significantly reducing trips to the local health center, the women could potentially use this time to seek public health education focusing on nutrition and sanitation. Educating mothers is essential because mothers empowered with information can implement the hygienic practices in their household, enhance the family diet, recognize the early signs of malnutrition in their children and make better decisions regarding illness. Furthermore, with this nutritional knowledge and the additional income earned from selling their textiles, these mothers could purchase food items containing nutrients that their diets often lack. Equipped with sufficient calories and the required nutrients, children will arrive to school eager to learn and able to absorb the material. This will lead to decreased dropout rates and enable more students to pursue higher levels of education. With such a wave of educated youth, the economy and quality of life are sure to improve not only for these children but for the community as a whole.

Economic Costs

While the installation of water filtration systems will greatly benefit local communities in terms of education, health and daily tasks, the potable water system's financial benefits and viability will ensure future projects continue. Although costs vary from project to project, the average cost for installation of a water filtration system in a community was said to be \$500-1000 per family; for the calculations,¹³ the ABGL team used the midpoint of \$750 per family. With an average community consisting of 40 families

¹² Different communities across the Quiche region specialized in weaving styles and techniques that incorporated various materials, and were for different household uses.

¹³ Calculations are shown in the Appendix.

and 200 people, this lead to a total cost of \$30,000, or Q235,636, to provide a community with potable water.

From the information gathered from the community interviews, it has been concluded that the greatest financial benefit to the community came from savings on medical care. The filtered water removes the pathogens that if otherwise ingested by a local, would result in illness. Inhabitants of Lacama I with access to clean water become ill 2 to 3 less times per year compared to the members of Xabillaguach who lack access to clean water. According to the communities interviewed an average trip to the hospital, consisting of diagnosis and treatment, costs Q500, and the transportation roundtrip to the hospital costs Q10. By simply preventing 2.5 trips to the hospital every year, individuals will save Q1,250 on medical costs and Q40 on transportation, with a total of Q1,290 saved. Therefore a community of 200 will save Q258,000 in health costs annually, compared to a cost of only Q235,636 to install the facility. Within a year, the average water system becomes economically beneficial. The benefits of the potable water system are reaped by the money saved from not having health expenses due to the improved water quality. This scenario shows the project's immense impact and savings for a community.

Unfortunately, even with these immense benefits, individual families are still spending more money than they earn on a monthly basis. For all communities surveyed, the men were able to work 15-20 days per month, earning Q40 each day for a total monthly income of Q800. The AGBL team was unable to quantify the women's financial contribution to the family, as creating and selling garments was negligible or unpredictable. The average family also spent Q800 on food each month, cancelling out the income earned. Additionally, other necessities need to be purchased and bills must be paid, such as another Q300-Q600 per month for each child attending school and Q100 for electricity. Families' inability to afford basic necessities forces them into this cycle of poverty, and with no incoming employment opportunities, they are forced to repeat it for generations.

A potential solution to this cycle is providing microcredit loans to individuals in the community. These are small, low interest and short term loans allowing members of the community to seek out and take advantage of opportunities. Unlike traditional loans, collateral should not be required. This is to prevent banks from taking advantage of the impoverished, and minimize the penalties if a default occurs. Using land and home as collateral and having it taken away would be a crippling experience, and one that should not occur when the goal is to help these families. Financial and entrepreneurial guidance is also recommended to help beginners and their businesses succeed. The goal of microcredit loans is not to continuously fund the communities, but rather to provide a temporary boost, helping to create a self

sustaining, and growing economic environment. The instillation of water treatment facilities provides great assistance for the people of Guatemala, but it is not the final step necessary for families to overcome poverty.

Entrepreneurship Workshop

To help initiate those next steps, the AGBL team led an entrepreneurship workshop in San Andres, a community that has had potable water for over twenty years. The AGBL team met with 50 men, women, and children of the community, including the priest and the mayor, to discuss community needs and generate ideas. To begin, the AGBL team asked the community to come up with a list of things their community is proud of as well as skills and assets they possess. Next, the AGBL team asked each person to say one thing they would like to see changed in the community and ideas they had of business opportunities. The AGBL team then consolidated this opportunities list and presented three opportunities to the community. The community members elected one of the options, las petates¹⁴, to be used as an example for the entrepreneurship process. The steps necessary to create a potential community business such as training needed, community participation, and marketing tools were discussed. The AGBL team's hope for the entrepreneurship workshop was to spark initiative and innovation within the community and brainstorm potential business practices in the local community. With the basic need of water met, local leaders hope to further improve the standard of living and provide more opportunities to the community through the means of entrepreneurship.

Conclusion

Access to clean water has an immense impact on a community. As seen in Lacama I, the most evident benefits of potable water are the significant reduction in time needed to complete daily tasks and a noticeable reduction in the amount of illness. By eliminating 40-50 minute trips each way to get water as well as reducing the amount of trips to the doctor and decreasing time spent caring for ill children, women now have more free time which can be used to weave products that can be sold, to generate a business or to learn a new trade. This enables the women to earn extra income which can help support the family and maintain the water system. Likewise, free time enables women to seek more sanitation,

¹⁴ Las petates are a type of woven mat that is made from the leaves of the plant palma de petate. These mats are often used for sleeping or as a surface on which corn and beans are placed to dry in the sun. Other common items made from the leaves of palma de petate by the women in San Andres include hats, shoes and fans. These items are purchased mostly by tourists. The stems of palma de petate are very strong and can be used for poles or making rope. The community of San Andres does not manufacture goods from the stems but does sell them to companies in the capitol that do have the means to make these products.

health and nutritional education to further improve the health of their families and communities now that the critical first step of water has been established.

Once the basic right of water and other necessities are met, communities are in need of funding to stimulate their economy. At present, families have no opportunity to invest or grow due to barely making ends meet. Unable to afford schooling, children seek work, often in the same area as their parents, a path paved with high unemployment and poverty. Unless something is changed, opportunities are granted and the economy is stimulated, this cycle of poverty will continue to repeat. As previously stated, the issuance of microcredit loans is the favored method of funding. Although many businesses will fail early on in this process, the ones that do succeed will grow, creating income and jobs. This success will allow entrepreneurs to share their knowledge acquired through trial and error with other potential entrepreneurs and community members, allowing for better success rates overtime. To fully capitalize on the installation of the potable water systems which yield women the novelty of free time, women should be encouraged to take out these microcredit loans and use this newly found time to start businesses. Microcredit is a powerful tool that can empower these communities, but it must be governed to protect the borrowers. This may be a slow process, but it is the best option to stimulate the economy, start businesses, initiate investments and create self-sustaining communities.

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Appendix. Demonstrated Calculations.

Expense	Calculation	Amount
Installation cost of community water system (dollars)	Cost per family × number of families	$\$750 \times 40 = \$30,000$
Installation cost of community water system (Quetzals)	Cost in dollars × current exchange rate	$\$30,000 \times \frac{Q7.8545}{\$1} = Q235,636$
Healthcare costs prevented per individual	Cost per visit to medical center × number of visits prevented annually	$Q500 \times 2.5 = Q1,250$
Total healthcare savings per individual	Healthcare costs prevented per individual + cost of transportation prevented	$Q1,250 + Q40 = Q1,290$
Illness related costs prevented for the community	Total healthcare savings per individual × number of community members	$Q1,290 \times 200 = Q258,000$
Monthly Family Income	Income per day of work × number of days worked per month	$Q40 \times 20 = Q800$