

Edited by Kathleen Thurmes



Document 526
POST IMPLEMENTATION REPORT

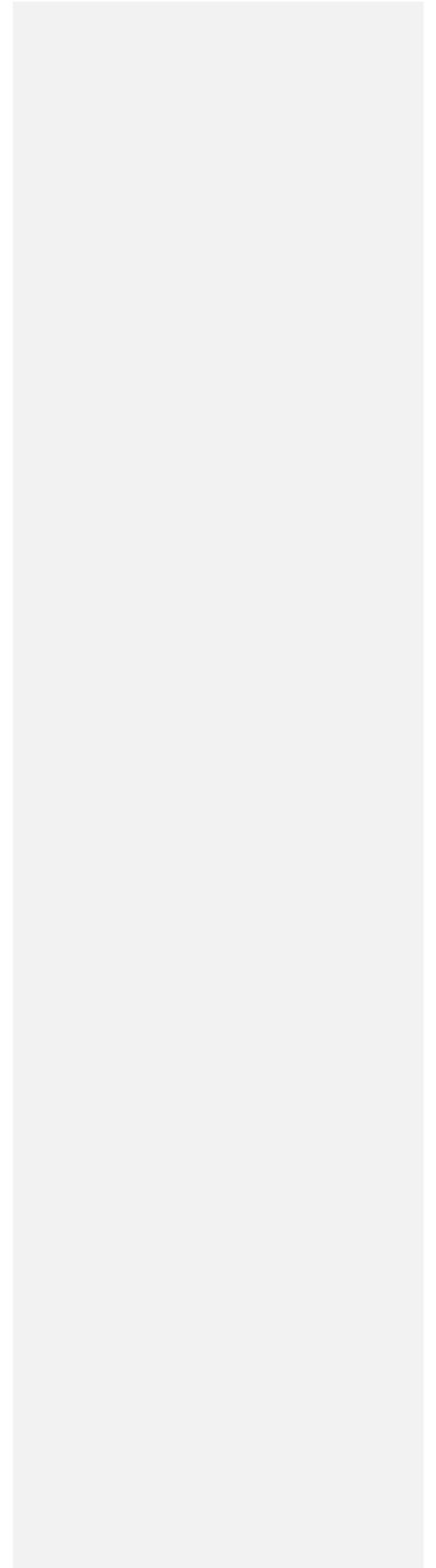
CHAPTER: [University of MN - TC](#)
COUNTRY: [Uganda](#)
COMMUNITY: [Mulobere](#)
PROJECT: [Micro-Irrigation and Improved Cookstoves](#)

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Submittal Date

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Community, Country – Mulobere, Uganda
Project Name – Micro-Irrigation and Stoves

Post Implementation Report Part 1 – Administrative Information

1.0 Contact Information

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Project Leads	Adam Both	afboth@gmail.com	206 484 9532	UMN
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2.0 Travel History

Dates of Travel	Assessment or Implementation	Description of Trip
August 2007	Assessment	Review the Site for a Rain Harvesting System, Investigate the local cost supplies
6/07/09-6/24/08	Implementation	Rainwater Harvesting System
6/01/09 – 6/30/09	Implementation	Groundwater Supply and Distribution
January 2010	Assessment	Assessment of MicroIrrigation, Improved Cookstoves and Community Pumps

3.0 Travel Team

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Name	E-mail	Phone	Chapter	Student or Professional
Katheryn Hope	Hopex028@umn.edu	715 252 0552	UMN	Student
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Jane Davidson	jhd@me.umn.edu	612 626 9850	UMN	Student

4.0 Safety

4.1 Safety Incident Reports

There were no safety incidents.

5.0 Budget

5.1 Cost

Expense	Total Cost
Airfare	\$19,800
On Ground	\$6,980
Materials	\$13,150
Other	\$330
Total	\$40,260

6.0 Project Location

Longitude: 31.4171

Latitude: -0.39706

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Post Implementation Report Part 2 – Technical Information

1.0 INTRODUCTION

The purpose of this Phase III implementation was to initiate the use of efficient wood-burning stoves and small-scaled micro-irrigation systems by subsidizing the cost and encouraging usage through education. These interventions were successfully established in the communities surrounding the Hope Integrated Academy, where past projects have been completed and collaboration has been fostered since 2007.

Hope Integrated Academy (HIA) functions as a secondary school, after-school program venue, women's outreach center, and community center. It is located near the village of Kyetume, Uganda, which has a population of approximately 3,000 people. The school currently has over 200 students participating in the after-school program, many of whom live in the surrounding communities. Uganda Rural Fund, the non-profit organization that initiated and manages HIA, hosts volunteers year-round to help at the school and throughout the neighboring communities.

Over the past school year, the University of Minnesota chapter of Engineers Without Borders (EWB-UMN) researched and designed solutions to introduce improved stoves and micro-irrigation systems in the communities near HIA. The stoves were purchased from a local company, Ugastove, based in Kampala, Uganda, and subsidized and delivered to the communities by EWB-UMN students. The small-scale micro-irrigation systems were made from readily available local materials, and were installed in the home gardens of women from the women's outreach group of HIA. A team of ten EWB-UMN students and one professional engineer traveled to HIA for three weeks in June 2010 to implement the researched interventions. The success of the project was ensured by working closely with HIA staff and a selected group of secondary students, to act as translators, and to be knowledgeable with the new technologies. In this way, trust was developed in the households receiving the interventions, and the people responsible for maintenance were made known.

A number of challenges were encountered during the implementation of this project. The EWB-UMN team discussed and handled each problem effectively in order to leave the site with a complete, successful project. The challenges faced and the resulting solutions are also presented within this report.

2.0 PROGRAM BACKGROUND

Our project was focused on a sustainable solution for an improved stove and micro-irrigation method. The stoves were bought from a local company, Ugastove, based in Kampala, Uganda. Wood-burning stoves were preferred, since wood is the cheapest and most common source of fuel in the area. Furthermore, wood-burning stoves were preferred by community members during demonstrations on our January assessment trip. The stove's design has been shown to

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reduce carbon monoxide and particulate matter in preliminary tests, and has been proven to be more efficient than the common three-stone fire method. The emissions from three-stone fires has also been linked to the development of many respiratory diseases, due to prolonged exposure to particulate matter, especially in women and children. This was one of the primary concerns we addressed, along with the recent decline of firewood in the area as fuel.

This area of Uganda is right below the equator, and therefore does not have a distinct winter and summer, only two dry-seasons and two wet-seasons. During the dry-seasons, the price of locally grown fruits and vegetables can increase by up to 300 percent. During this time, food scarcity becomes a major problem for many families. Water is also scarce, and therefore cannot be used in excess for crops. Micro-irrigation is a method that can be scaled for usage in various sized gardens, and allows crops to grow with the minimal amount of water necessary. The water is delivered to the root of each individual plant through small holes in pipes that connect to a bucket at the top of the system. In this way, the plants can be watered even during the dry season. This system allows families throughout the community to ensure food is available during the dry season and to produce more crops at this critical time to lessen the effects of the drastic change in prices. Although this is based on a simple technology, general education and training on the use of the system were addressed in the women's outreach meetings to ensure a successful project.

3.0 TRIP DESCRIPTION

An essential part of our implementation was our close interaction with HIA staff, students, and community members. This ensured an understanding and, in turn, a successful adoption of the new interventions. The EWB-UMN team worked with ten HIA secondary school students, who were selected to become the local "Clean Air Team." These students were trained in the usage of the Ugastove to ensure correct maintenance throughout the year, as well as a general scientific knowledge of the effects of exposure to such harmful compounds. They aided the EWB-UMN team in translating and administering surveys to the community members before and after the stoves were distributed. This was also accompanied by careful monitoring of carbon monoxide, particulate matter, and temperature, to ensure that the stoves improved the conditions and were properly used.

The EWB-UMN students built micro-irrigation systems from readily available parts and worked with the local women to build gardens and install the systems. The positive relationship developed between the team and the locals encouraged ownership of the interventions, and led the women of the community to be very receptive to this the new technology.

4.0 COMMUNITY

4.1 Description of Community

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Kyetume is in the Masaka district of Uganda, approximately 45 minutes (30km) from the city of Masaka. The community surrounding the school is rural in character with paths between villages that can only be traversed on foot or by bicycle. Kyetume is a small single-dirt-street town with shops on the main street; it is located on the main two-lane highway approximately a quarter of a mile from Hope Integrated Academy. The community is mostly made up of the Bagandian tribe who speak Lugandan and minimal English. Most residents of the area are subsistence farmers with small side businesses that sell to people in the surrounding villages and towns. A majority of residents do not own cars or motorcycles and thus travel by foot carrying loads on the community bicycle or by working together with makeshift-jerry-rigged carts. A majority of resident's homes do not have running water. Water is gathered from the groundwater well at Hope Integrated Academy or from local surface water and placed in plastic containers called "jerry-cans" and carried for long distances back to resident's homes. All residents cook in a separate structure over a three-stone fire. Hope Integrated Academy consists of several hundred male and female students that are all enrolled in secondary schooling. Their ages range from 14 to 20 years and their language skills range from limited to fluent English.

Given the success of previous EWB projects at Hope Integrated Academy, the communities that surround the school were eager to work with both EWB and URF on new projects. Of the twelve communities that surround Hope Integrated Academy, URF staff members decided to pilot the cookstove project in the Gankanga and Kywagonya communities. Over the past three years, EWB members have developed relationships with many of the individuals living within these two communities, especially the students and women's group members. Thus, working in the Gankanga and Kwayagonya communities was a natural step forward in our efforts to expand and transition our projects from the school to the surrounding communities. Additionally, both communities are relatively small in size, in close proximity to the school, and they encompass a large portion of the student body and the women's group members. The micro-irrigation systems were installed in the Begonzie, Kalisizo, and Kalabandagala communities.

4.2 Community Relations

Maureen Nakalinzi(head of the women's empowerment group) and the Clean Air Team members(comprised of eight students living in the Gankanga and Kwayagonya communities)were the key contributors to the implementation of the cookstove project. Maureen was integral in selecting the Clean Air Team members and in identifying the households who were interested in purchasing cookstoves.

The Clean Air Team members were selected because they lived in Gankanga or Kwayagonya, they were proficient in both Lugandan and English (as to serve as translators/liasons between the EWB project members and cookstove recipients), and because they were reliable, motivated and outgoing students.

The cookstove recipients consisted of primarily women's group members. They were identified by Maureen and were selected because of their need, ability to purchase and their willingness to

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pilot the new cookstoves. Maureen's recommendations were also based on the interest expressed by the women during the demonstration and information session held during the assessment trip in January 2010.

To ensure a sense of ownership, the cookstoves were sold to the women's group members at a subsidized cost, rather than given free of charge. The price that was decided upon was established from discussions with Maureen during the January assessment trip.

Air quality education, via the Clean Air Team, in conjunction with the projects implemented, enabled the community members to realize the full health benefits of their new cookstove interventions. It also made them more inclined to adopt the interventions and behavioral changes, which ultimately will lead to the success and sustainability of the cookstove project. The Clean Air Team educated and sensitized the cookstove recipients on the proper usage and maintenance of the cookstoves. They also taught the recipients about combustion and respiratory health. The concepts of complete versus incomplete combustion, and the notion that indoor air pollution can have detrimental and chronic health effects was new to both the students and cookstove recipients, so they were eager to learn about the benefits of the improved cookstoves. As with the adoption of any technology and behavior change, education and outreach are critical elements for the continued operation and maintenance of the cookstove project.

During our stay, interest in the Clean Air Team grew. Interest in the cookstoves also grew within the Gankanga and Kywagonya communities and in the other communities surrounding HIA. The women using the new cookstoves preferred using them over the traditional three-stone fire, and the women that did not have the cookstoves wanted to acquire them. To accommodate the growing interest, we increased our cookstove distribution to households in other communities and we incorporated students from other communities into the Clean Air Team, and the number of Clean Air Team members grew from eight to thirteen.

Micro-irrigation Kits

As for the Micro-Irrigation Team, the community ownership and interest also appeared to be high. Anecdotally; after the Micro-Irrigation team installed the five systems we returned a week later to assess the status of the installation and determine if there were any issues with the systems or if the women had any questions. At this time we observed that the micro-irrigation systems were removed each evening (to prevent theft) and reinstalled each morning to be used each day. The women/families using the kits appeared to cherish the kits and were very excited about using them and the potential water saving and time saving benefits of the kits. Continued operation and maintenance for the micro-irrigation kits should be assessed when the next team travels. Each owner of a micro-irrigation kit was given a operation and maintenance manual and maintenance was verbally demonstrated with each owner at the site of their garden.

5.0 PROJECT SUMMARY

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5.1 Summary

Improved Stove Intervention

We introduced a locally manufactured improved stove (Ugastove) to nearly 60 households in two villages (Gankanga and Kywagonya) located in close proximity to Hope Integrated Academy. Households were recruited during meetings with local women's empowerment groups facilitated by our partner organization, Uganda Rural Fund, over the last 6 months. Households purchased the Ugastove for 15,000 UGX (~\$7.50 USD). The Ugastove is fabricated in Kampala, Uganda by Uganda Stoves Manufacturers Ltd. and its design is based on a class of stoves called rocket stoves (see our pre-implementation report for more details).

Our stove intervention also included an important educational component that involved URF staff, EWB-UMN members, and HIA students. We held educational community scale meetings both on our assessment trip in January as well as on our June implementation trip with interested households. These meetings included sessions on respiratory health, potential fuel savings, and stove operation. During the June community meeting, we also invited representatives from Uganda Stoves Manufacturers Ltd. to give a stove demonstration as well as speak about the potential for a local stove manufacturing facility. The community-based educational sessions were reinforced during stove distribution by one-on-one sessions with a group of students from HIA chosen by URF staff known as the 'Clean Air Team'. These students were given extra educational sessions by EWB-UMN members and were responsible for performing household level surveys regarding stove use, cooking behavior, and changes in environmental conditions for each participating household.

Lastly, as a joint effort between EWB-UMN and an undergraduate research team, extensive monitoring of indoor air pollution and objective measure of stove use was administered to each household before and after introduction of the Ugastove. The monitoring scheme we employed will eventually allow for the quantification of the health benefits that can be expected resultant from substitution of the Ugastove for traditional cooking methods. The details of the monitoring protocol are discussed in Section 7.0: 'Monitoring and Evaluation'.

Micro-irrigation Kits

This area of Uganda is right below the equator, and therefore does not have a distinct winter and summer, only two dry-seasons and two wet-seasons. During the dry-seasons, the price of locally grown fruits and vegetables can increase by up to 300 percent. During this time, food scarcity becomes a major problem for many families. Water is also scarce, and therefore cannot be used in excess for crops. Micro-irrigation is a method that can be scaled for usage in various sized gardens, and allows crops to grow with the minimal amount of water necessary. The water is delivered to the root of each individual plant through small holes in pipes that connect to a bucket at the top of the system. In this way, the plants can be watered even during the dry season.

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This system allows families throughout the community to ensure food is available during the dry season and to produce more crops at this critical time to lessen the effects of the drastic change in prices. Although this is based on a simple technology, general education and training on the use of the system were addressed in the women's outreach meetings to ensure a successful project.

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The EWB-UMN team visited multiple irrigation companies in Kampala before finding Gentex, a hose/pipe and fitting supplier that sold drip tape and the necessary connection. The team also investigated local markets to see if micro-irrigation systems could be built from more readily available materials. The team's conclusion was that Gentex sold higher quality materials at a lower cost than could be acquired in the market. Using Gentex drip tape and connections, the team built six systems, five in gardens of community women's groups, and one at HIA. The team also taught a class at HIA to the students about the principles of drip irrigation and the maintenance of the systems.

5.2 Difference Between Planned and Actual Implementation

Improved Stove Intervention

The majority of the implementation followed the plan outlined in our pre-implementation report. There were a few minor deviations as follows:

Stove distribution schedule – We were dependent on URF staff and the Clean Air Team for the timing of the distribution trips and translating. Since the Clean Air Team is only available after school and because of the limited availability of URF staff our overall project schedule did not exactly follow the schedule originally agreed upon. Ultimately, this had little effect on the project as a whole but shifted some activities to different portions of the trip than originally planned.

Monitoring of three-stone fires – In our original implementation plan, we intended to monitor both the Ugastove and three-stone fires for frequency of use using temperature data loggers. Monitoring the three-stone fires proved difficult due to the high temperature of the fire. Our instrument setup was ultimately able to pick up changes in temperature due to cooking events. However, it is likely we were observing changes in room temperature which may or may not be associated with cooking. Further analysis of this data upon completion of the monitoring cycle will dictate the validity of the three-stone fire data.

Inability to monitor all households for indoor air pollution – We were not able to monitor indoor air quality for a small number of the households that received Ugastoves. In most cases this was due to the condition of the kitchen used for cooking. These households usually had a small shelter that lacked walls and had only partial roofs for cooking. Attempting to monitor indoor air pollution under those conditions would not yield

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reliable measurements and also would jeopardize the monitoring equipment by exposing it to rain or other weather conditions.

Micro-irrigation Kits

System selection procedure -- The main difference in the micro-irrigation portion of the project was during the system selection procedure. Instead of buying several different types of system components and testing each system individually, the team was able to find micro-irrigation kits in Kampala. Although we did not have several systems to test, we did test the irrigation kit using dirty water and inclined planting beds.

Varied System Sizes -- As stated in the pre-implementation report, five systems were distributed to local women. One difference between the planned and implemented systems was that the kits were varying in size depending on the length and width of the plot.

Bucket Elevation Structure -- Another minor difference was the structure used to elevate the bucket. Our team planned on implementing a structure which consisted of two vertical poles dug into the ground with a horizontal cross brace on which the bucket could be hung. After we arrived, the design was changed to a tripod structure. The tripod design allowed for the system to be moved to facilitate further irrigation of other plots owned by the user.

5.3 Drawings

Improved Stove Intervention

Our improved stoves were purchased from a local manufacturer, not built by members of EWB-UMN. Therefore, we do not provide detailed design drawings here. See Section 6.0: Photo Documentation for photos of the Ugastove as well as typical kitchen environments and placement of monitoring equipment.

Micro-irrigation Kits

The Micro-Irrigation parts were built for each women's group site uniquely. Please see Section 6.0 for system set-up.

6.0 PHOTO DOCUMENTATION

Photo Documentation – Stoves

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Ugastove representatives (left) during the Women's Empowerment group meeting at Hope Integrated Academy explaining how the Ugastove works.

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EWB member demonstrating how fuel should be used.

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Women's group member learning fuel usage practices.

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A student member of the Clean Air Team with EWB members assess where the Ugastove should be placed within the kitchen.

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Monitoring equipment implemented in kitchen. Equipment included temperature logger (lower center), particle monitor (fixture, upper right) and CO monitor (hanging, upper right).

7.0 MONITORING AND EVALUATION

Improved Stove Intervention

To evaluate the effectiveness of the Ugastove when distributed to new users, we quantitatively monitored frequency of use and indoor air pollution. We also qualitatively measured fuel use (via surveys given by the Clean Air Team). The goal of this monitoring program was to determine the health impact associated with changes in combustion emissions when substituting a three-stone fire for a Ugastove. We also were able to objectively measure the adoption rates in each household over a 1-2 month period (via temperature loggers on the Ugastove). To accomplish these goals, we deployed air pollution monitors that measure (1) PM_{2.5} (particulate matter of diameter 2.5 microns or less) and (2) CO (carbon monoxide) as well as temperature loggers attached to the Ugastove to observe adoption and usage rates (we also monitored three-stone fire use by locating a temperature logger in close proximity to the fire). Both indoor air pollution and temperature logger measurements were performed in every household before introduction of the Ugastove and then again about 1 month after the Ugastove was introduced to the household. For more information regarding the specific equipment and protocols used, please see our pre-implementation report.

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Our team was able to distribute Ugastoves nearly 60 households and complete baseline air pollution monitoring for each household. A University of Minnesota undergraduate research team is currently completing the monitoring of each household post-installation of the Ugastoves. They are scheduled to complete the second round of monitoring by August 12th, 2010. Once this data is collected, we will be able to determine the effectiveness of the Ugastove's ability to reduce kitchen air pollution concentrations. We will also be able to determine the overall adoption rate of these stoves for each village. This will ultimately determine how effective our project has been and point to areas that could be improved in future stove intervention projects.

Micro-irrigation Kits

A member of the URF staff, Maureen, will monitor the Micro-irrigation Kits. The EWB team wrote a survey that included questions about how the micro-irrigation systems performed, what maintenance was needed, and the women's preferences about what could be improved. This survey will be administered on two dates, July 5 and August 7. The EWB team also left Maureen with a supply of replacement parts – if any women request replacement parts EWB-UMN will be notified by Maureen.

A micro-irrigation system was also installed at HIA. Two University of MN students who are working on a summer research project will monitor this system. When they return to the United States, they will meet with EWB-UMN to evaluate how the kit performed.

8.0 LESSONS LEARNED

Problem: URF Staff was consistently late to appointments with EWB.

Lesson: “Africa time” is unpredictable in rural areas. The concept of “Africa time” is well known in international development work—the idea that things take much longer than expected to come to fruition. In our experience at Hope Integrated Academy, many activities ran counter to this expectation. With proper planning prior to the implementation trip, paired with timely and effective on-site meetings, projects were able to start promptly and proceed as planned.

Problem: Barclays no longer changes currency.

Lesson: Unlike previous trips, Barclays in Masaka no longer exchanges U.S. dollars for Ugandan schillings. We discovered that The Grand Imperial Hotel in Kampala is a better option for money exchange needs. The exchange rates at this location are exceptional as well. This highlights the importance of exchanging money upon arrival, rather than waiting until traveling to the project site.

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Problem: Ignored bug bites eventually revealed bug eggs.

Lesson: Don't ignore Jiggers or other insects. It is important to pay attention to and strive to avoid insect bites of every kind while in country. While the focus is often on mosquitoes and malaria, there are other insects that can cause health concerns as well. Jiggers, also known as "sand fleas," are insects common in Uganda where animals and humans share living space. Jiggers burrow into skin (commonly in feet) and lay eggs. It is important that EWB participants wear shoes to protect their feet from such insects.

Problem: The EWB project required too much of HIA students.

Lesson: Projects involving HIA students must accommodate variable schedules. The success of the stove project stemmed from student participation on the Clean Air Team. However, much was requested of the group outside regular school hours, including evenings and weekends. In order to alleviate stress, the Clean Air Team added additional members throughout the project duration. Specific days and times were assigned to Clean Air Team members based on their schedules. Even so, there were instances when a class was unexpectedly rescheduled or a student had to remain home. In these situations, it was important to be flexible and structure activities around the revised schedule.

Lesson: Field testing surveys is a critical step in effective survey methodology. The Public Health EWB members designed a cookstove survey using validated survey tools. However, when they discussed the survey with the Clean Air Team students, it was revealed that a number of the questions were worded in a confusing manner or did not make sense in the context of rural Uganda. Based on student recommendations, the survey was edited prior to its use in the field. This proved to be a vital step in ensuring information was collected in a culturally relevant way.

Problem: Insufficient emphasis on personal greetings. In Ugandan culture, a lot of value is placed on personal greetings. Just a "hello" can be sufficient in American culture, but this is not usually the case in Uganda. Due to shyness, language barriers, etc. there were occasions where no greeting or only a weak greeting was expressed by the team members when entering a local's home for project purposes, as well as on a few other project-related occasions. Several Ugandans have made comments regarding this behavior, saying that many of the team members were not "easy" to talk to. Building trust between the team and the community is essential for our projects, so cultural sensitivity to things as simple as saying hello is a necessity.

Lesson: Putting an emphasis on personal greetings can be one of the simplest ways to start and maintain a meaningful partnership. During the trip, several attempts were made to learn some simple greetings in Lugandan. Using these phrases with community members with whom we worked showed positive results, including the frequent helping hand. Other team members simply said their greetings in English and shook hands with community members while showing sincerity, which in turn proved to have similar results. For future travelers, it is good to keep in mind that a proper greeting between oneself and a partner community member is not just saying

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“hello” in passing. “Oli otya?” or “Hi, how are you?” is one standard greeting in Lugandan, and it requires the speaker to wait for a response. Giving the person a moment of direct engagement or sincere attention can be incredibly meaningful in any culture. Handshakes and a body language that communicates “I am listening to you” are also very warmly appreciated even if neither knows the other’s language.

Problem: It is difficult to find plastic parts in the market. Many of the needed connection pieces for the drip-irrigation kit were not found in plastic at the market place – almost all of the correct connection parts we found were only sold in brass or another metal. These metal pieces were also only found in small quantities in the market place. Our searches in Kampala were mainly focused on the Nakasero Market.

Lesson: Instead of going to very small businesses at the market, the team invested more time in larger companies that sold their parts on a larger scale. Many of these companies were found in the “industry area” of Kampala, and proved to have a larger variety of plastic pieces in larger quantity. Gentex was the most helpful company for plastic connection pieces.

Problem: Difficulty understanding the difference in how business is conducted.

While the micro-irrigation team was in Kampala looking for parts, the team ran into trouble with one of the most promising companies: Balton. The team had assumed that the information Balton gave us about the inventory and availability of the needed parts was accurate, but we soon found that this was not the case. While the first visit to Balton assured us that all the parts we needed were available in the quantity that we needed, the second trip revealed that not all the parts were present, and what parts were present had mostly been bought up by another customer. It became evident that advertising and sales pitches in Kampala sometimes include inaccurate accounts of availability, quantity, or quality. With only a few days left in Kampala, this was a major frustration.

Lesson: The team continued the search for a different larger-scale company that would have the needed parts, while giving Balton a deadline to have the promised pieces available for us to purchase. After some networking was done, the team went to Gentex which had all the parts and actually displayed a micro-irrigation garden kit inside. This seemed very promising as several smaller businesses were unsure of what we were even trying to build. Having learned a lesson from Balton, the team made sure to physically see all of the pieces and count them before assuming that this was the final stop. Once all the parts were found to be there in the quantity and quality needed, the purchase was made.

I know you said this document was repetitive, but is this question supposed to be in here twice?

Problem: Insufficient emphasis on personal greetings.

In Ugandan culture, a lot of value is placed on personal greetings. Just a “hello” can be sufficient in American culture, but this is not usually the case in Uganda. Due to shyness, language barriers, etc. there were occasions where no greeting or only a weak greeting was expressed by the team members when entering a local’s home for project purposes, as well as on a few other

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project-related occasions. Several Ugandans have made comments regarding this behavior, saying that many of the team members were not “easy” to talk to. Building trust between the team and the community is essential for our projects, so cultural sensitivity to things as simple as saying hello is a necessity.

Lesson: Putting an emphasis on personal greetings can be one of the simplest ways to start and maintain a meaningful partnership. During the trip, several attempts were made to learn some simple greetings in Luganda. Using these phrases with community members with whom the team worked with showed positive results, including the frequent helping hand. Other team members simply said their greetings in English and shook hands with community members while showing sincerity, which in turn proved to have similar results. For future travelers, it is good to keep in mind that a proper greeting between oneself and a partner community member is not just saying “hello” in passing. “Oli otya?” or “Hi, how are you?” is one standard greeting in Luganda, and it requires the speaker to wait for a response. Giving the person a moment of direct engagement or sincere attention can be incredibly meaningful in any culture, and is especially important in Uganda. Handshakes and a body language that communicates “I am listening to you” are also very warmly appreciated even if neither knows the other’s language. As a further suggestion, consider spending free time with community members instead of isolating oneself with only other EWB members. This will aid in creating a more open and trusting relationship between Engineers without Borders and the Mulobere community.

Comment [SH2]: Repeat?

Problem: the drill chargers brought from the U.S. were found not to function once in Uganda.

Lesson: Test drill chargers, and ALL equipment, before leaving the U.S.

Problem: Bodas (a kind of taxi) cost more during rush hours. Although the price to get to Nakasero Market from our hostel in Kampala (about 3 km away) cost us less than 3,000 shillings, the ride back was ~5,000 shillings when it was rush hour. After bargaining with several people in different locations of the market, we were unable to find a better deal.

Lesson: The team always bargained, but brought extra money during rush hours in anticipation of the added expense.

Problem: There were similar-sounding words in English and Lugandan. The word “chicken” and “kitchen” sound very similar in English, and the words “amazzi” (water) and “amazi” (feces) sound very similar in Lugandan.

Lesson: Whenever there is a language barrier, having patience and knowing how to play charades is a great way to overcome it. When there was a difficulty in understanding, lots of hand motions, pointing, and further explaining what the word meant was the best solution when no translator was around.

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LUGANDA PHRASES

Greetings

Good Morning: Wasuze otya ?
Good afternoon or Good Evening: Osiibye otya ?
Hi, how are you?: Oli Otya?
- The answer is Gyendi meaning "I am ok" or Bulungi meaning "good"
Have nice day: Siiba bulungi.
Good night: Sula bulungi
Saying goodbye to one person: Weelaba.
Saying goodbye to more than one person: Mweraba
Welcome to one person: Tukasanyukidde.
Welcome to many people: Tubasanyukidde
-The response to welcome is: Kale
See you later: Tunaalabagana
What is your name? Erinya Iyo gwe ani?
I am (name): Nzy (name).
Nice to meet you: Nsanyuse
Madam: Nyabo.
Sir: Ssebo

A few conversation words

Please: Mwattu.
Thank you: Weebale
Thank you very much: Weebale Nnyo.
No thanks: Webale ne nedda
No: Nedda
Yes: ye
Please come in: Mwattu yingira.
Excuse me in order to get someone's attention: Owange
Please sit down: Mwattu tuula wansi.
Pardon me, what did you say?: Wangi? or Ogamby Ki?
Apologizing or saying I am sorry to one person: Nsonyiwa. To many: Munsonyiwe
OK: Kale.
I do not know: Simanye
What time is it?: Sawa mmeka?
How much does it cost?: Ssente Mekka?
I do not have any money: Sirina Sente
I love/care for you very much: Nkwaagala nyo
We are going: Tugenda
I wont: Sijja!

I am:

angry: ndi munyiivu.
cold: mpulira empewo.

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sick: ndi wulwadde.
am full: ndi mukufu.
happy: ndi musanyufu.
thirsty: ennyonta ennuma
hot: mpulira ebbugumu.
hungry: Enjala ennuma.
tired: nkooye.
sad: ndi munakuwavu.
scared: ntidde.
worried: ndi mweraliikirivu

Other Words

Cool/Awesome: Kirungi
Beautiful: mulungi
Crazy: mulalu You are crazy (saying to one person as a joke): Oli mulalu!
Me: Enze
You: Gwe
Friend: Mukwano
Car: Emmotoka
Bicycle: Eggali
Telephone: esimu
School: Esomero
Water: Amazzi (hold the Z or you will accidentally say feces!)
Well done: Jjebale
Mosquito: ensiri
Come: jangu
Good Luck: mukisa mulungi
What? Wangi? (used most when answering the phone or when someone is calling your name)

9.0 NEXT PHASE OF THE PROGRAM

Phase IV: Community Water Plan Assessment

Anticipated Travel Date: January 2011

For the dozen communities surrounding Hope Integrated Academy (HIA), the nearest water source is often a half-day's walk away. The burden of water collection occupies a significant portion of one's day and falls disproportionately on women and children. The few water sources that are available are seasonally-varying and contaminated with harmful pathogens. Without a means to treat this contaminated water, many individuals, especially young children, fall ill with waterborne diseases such as diarrhea and dysentery.

In addition to this evidence of need, the community members themselves identified a great need for water source and water treatment interventions during previous visits and community health assessments. Accordingly, EWB-UMN is working to develop a cohesive, locally sustainable, and comprehensive community water plan addressing both water supply and water quality. Current

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ideas include well remediation, surface water development, and implementation of point-of-use water treatment methods.

During the spring of 2010, the project team worked to identify and study potential interventions for the aforementioned problems. The main objective of the assessment trip is evaluating the feasibility of the numerous options. Objectives are listed below:

- 1) **Water Usage and Availability:** To evaluate water quantity, the team will determine the current water uses and water sources for the various communities surrounding the school in which URF works.
- 2) **Water Supply:** The team will investigate the conditions and issues surrounding the hand pumps in these communities, evaluate the desirability of personal rainwater harvesting systems and the feasibility of constructing said systems from local supplies, and evaluate the desirability of surface water sources and the feasibility of constructing and maintaining such sources.
- 3) **Water Quality:** The project team will quantitatively analyze the quality of the current drinking water sources used in the communities in which URF works.
- 4) **Public Health:** Simple interventions regarding sanitation, hygiene, water quality, safe water storage, and water treatment methods will be discussed with community members.

10.0 MENTOR ASSESSMENT

10.1 Mentor Name (who wrote the assessment)

In June 2010, I accompanied ten students in the University of Minnesota EWB group to Uganda and served as their mentor in Mulobere for the Micro-Irrigation and Improved Cookstoves project. This was my first experience as an EWB mentor. My overall assessment of the trip is that it was a great success in terms of both planning and implementation. Personally, I enjoyed the experience and hope to be able to serve as a mentor in the near future.

I joined the team just a few weeks prior to arrival in Uganda due to the unexpected withdrawal of their initial mentor. Thus, I relied heavily on the student engineers for travel and pre-implementation planning. Prior to travel, the team was asked to reassess the scope of the project by EWB. This request was made in part because of my limited experience with water quality. Specifically we were asked to 1) eliminate implementation of the water treatment portion of the project, 2) to reduce the micro-irrigation project from a full implementation to a pilot implementation, 3) to consider reducing the number of stoves from 60 to a more manageable number, and 4) to limit the travel team to six students.

After meeting with the students and assessing their plans, we agreed to items 1-3. However, based on my assessment of the experience, maturity, and capabilities of the team, I felt comfortable with the size of the travel team and our group remained at 11—ten students and one

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mentor. Now that the trip has been completed, I am confident that this decision was a good one. There were no problems from the management side. Travel logistics were handled extremely well by the students and the team functioned effectively as a group. Management on-site included team meetings each morning and evening. Implementation, particularly working with the Uganda Rural Fund personnel and members of the community, benefitted from the experience of the students who had been in country the year before. Having 10 students was very helpful once we began installation of the instrumentation and stoves in the community. This part of the project required at least two students at each installation site. The sites were spread out over a relatively large geographic area so using multiple teams allowed us to implement the stoves as originally planned. Also the diversity of expertise within the team was helpful. Some of the students were particularly effective at working with the community and others focused more on the engineering aspects of the project including on-site design of the micro-irrigation systems and calibration, installation and monitoring of instrumentation for the stove project. There was some downtime over the course of the project but the students used this time for future planning and needed relaxation. It would have been possible to reduce the team to 7 to 8 students but we functioned well as a team with 10 students. In addition, taking the entire group provided the benefit of training the less experienced students for future leadership of the Uganda travel team in the future.

If I were to change any aspect of the project, it would be an expansion of the micro-irrigation project. After some initial difficulties in finding a supplier, the team was able to purchase the needed parts from a large supplier in Kampala and implementation proceeded very quickly. It would have been relatively easy to install more micro-irrigation kits within the community during this visit and it would have been more cost effective. Community acceptance was high. I saw no risk to expanding the pilot study and in fact believe we would have benefitted from installing at least 10 kits in a larger diversity of gardens. An assessment of durability and ease of use over the next few months will be important factors to consider prior to expansion of the pilot study. Another consideration will be sizing the system for larger fields.

The stove project was much larger in scope and in fact continued beyond the EWB work. The team had arranged purchase of the stoves in advance and no problems were encountered with the vendor. There was sufficient interest by the community to place all 60 stoves. The students did an excellent job of planning and implementing a testing protocol for monitoring particle emissions and carbon monoxide in the kitchens. These data had not been analyzed prior to the end of our EWB trip and thus it is premature for me to assess the overall success of the stove project. Anecdotal evidence suggests smoke emissions are reduced. I look forward to seeing the pre and post implementation data from the trip. My only comments based on observation of the stoves are that they are not as versatile as the traditional three-stone fire in terms of pot size and that the design could be modified slightly to address this limitation.

In addition to the two new projects, the EWB team evaluated the status of their prior projects including repair of the solar driven pump, and assessment of necessary maintenance and repair of the rain water catchment system and sanitation building. They continued training of on-site personnel for these systems. On-site maintenance is an issue that must continued to be addressed.

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The only concern during the trip arose because of the use of what I would term excessive corporal punishment at the Hope Integrated Academy. On the last day of our visit, many of the students were caned by the teachers and staff of Uganda Rural Fund. On a personal level, this was shocking to our group and left a poor impression of the URF staff. I plan to discuss this incident with Diana Underhill.

In summary, this project was completed successfully and professionally by the University of Minnesota Student Chapter. I found great personal satisfaction in the experience and hope to have the honor of accompanying other EWB groups in the future.