Social Life Cycle Assessment and Health Impacts of Ceramic Water Filters in Uganda

Dow Distinguished Awards Project

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SWB Uganda Dow Progress Report and Large Grant Competition

Executive Summary

Sustainability Without Borders-Uganda's (SWB-Uganda) report presents an update on the team's progress to our goals. Currently, 61 percent of Ugandans lack access to safe water (Water.org, 2018). With a population of 42.8 million people, this equates to more than 26 million people based on 2017 population estimates by the Ugandan Population Reference Bureau (Centers for Disease Control and Prevention, 2017). Like most of the developing world, diarrheal diseases are the number one cause of death among children under five years old (Centers for Disease Control and Prevention, 2017). Among all age groups, diarrhea can still be found among the top ten causes of death in Uganda, continuously securing the sixth spot for the past ten years (Institute for Health Metrics and Evaluation, 2017). In response to this problem, the organization SPOUTS of Water (SPOUTS) developed their platform in Kampala, Uganda, and the nearby rural town Namasagali. SPOUTS is a ceramic water filter manufacturer based in Uganda that aims to provide an effective and affordable method of water treatment filters to households that lack access to clean water. Despite their efforts over the years, the social impact of these filters on surrounding communities remains unknown.

SPOUTS is a social enterprise with an expected triple bottom line, who wants to develop better systems for understanding the social and environmental impacts of their water filters. For the past year SWB-Uganda has been conducting a two-part project: (a) Consumer Surveys and (b) Social Life Cycle Assessment (SLCA). The consumer surveys examine the effects of ceramic water filters on the health, environment, and livelihoods of Ugandans. The SLCA examines the social impacts of a ceramic water filter from the extraction of raw materials to the product's end-of-life. An SLCA is a fairly new and innovative technique of analyzing the social implications of sustainability solutions. Due to funding received from a 2019 DOW Distinguished Award Seed Grant our team was able to work on-the-ground in Uganda SPOUTs this past summer. With our four year project, SWB-Uganda is dedicated to providing a collaborative assessment of the ceramic water filter by integrating natural science, engineering, business, social sciences, and policy. Our central aim is to promote an interdisciplinary look at how we should understand the environmental, social, and economic effects of sustainability.

Currently, we have completed three iterations of our consumer surveys (Aug. 2018, Feb. 2019, Aug 2019). The surveys are biannually occurring in February and August and are proposed to continue for the next two years. During our last round of surveying, the team upgraded from paper surveys to computer-assisted personal interviewing (CAPI) software through a handheld tablet. For our SCLA, the team interviewed all available staff on the topics of fair salary and social benefits/social security. Managerial staff was additionally surveyed on social responsibility along with the two aforementioned items. A non-SPOUTS affiliated translator was trained to conduct surveys with participants who did not speak English. The team also conducted an ethnography of the working conditions in the ceramic water filter factory. Additionally, to build rapport and give back to the communities that we are extracting information from, the team purchased 12 ceramic water filters and donated them to two primary schools in Uganda. The team helped to install the filters, demonstrate the use and maintenance of the filters, and provide background information on water-borne illnesses.

Due to the fairly recent end of our data collection in Uganda, our team is still in the beginning stages of data analysis and cannot make any conclusive statements or recommendations.

Project Objectives

1. Complete and analyze consumer impact survey data collection and analysis
2. Create an interactive map with baseline data and GIS software to provide interested parties with a useful tool showing the health and environmental outcomes based on survey data and spatial relativity.
3. Conduct an SLCA to provide an initial report on the current practices of SPOUTS of Water and recommendations for the company's future endeavors. The stakeholders that we will consider include consumers, workers, local communities, society, and value chain actors.
4. Complete a community engagement project each year from a holistic perspective and out of respect for the lives of the subjects of study.

Progress Report

The team has met all of the goals according to the timeline discussed in the Seed Grant. During the summer months prior to our on-the-ground fieldwork in Uganda, we established a timeline for the visit, worked with the Center

for Socially Engaged Design to finalize a survey instrument, purchased tablets and installed a computer-assisted personal interview (CAPI) software to create an electronic version of the surveys, and continued to clean the existing survey data. For logistic preparation, we solidified with the team's stakeholders documents on project action items, risk management, and communication strategy. Upon arrival in Kampala, Uganda, where the SPOUTS central office is located, we began conducting the consumer surveys and the SLCA simultaneously. Methodologies used include 1) CAPI consumer surveys, 2) SPOUTS employee surveys, 3) ethnography of the ceramic water filter production and 4) SPOUTS manager interviews.

In order to conduct the third round of consumer surveys, we spent a day training three enumerators and two SPOUTS staff members on how to use our new CAPI software. Our team purchased tablets and created an electronic version of our original paper survey. This transition was beneficial in making survey data input easier and reduced the likeliness of misplacing the surveys. After the day of training, we and the trained enumerators/staff traveled to consumers in Kampala and later Namasagali to survey consumers who had received water filters (both donated and purchased) to understand the filter's economic, social, and health benefits for the users. GIS tracking of participant location was implemented to begin creating an interactive map with a useful tool showing the health and environmental outcomes based upon survey data and spatial relativity.

For the SLCA, we had two methodological objectives: a) to interview all levels and areas of staff and b) to assess the occupational and health conditions of the ceramic water filter factory. The S-LCA methodological framework provided a skeletal outline for what we would base our survey questions on. Our primary topics for this first round of S-LCA were based upon two stakeholder groups: the workers and the value chain actors. Surveys were conducted with all SPOUTS staff willing and available to be surveyed. During our first logistical meeting with the SPOUTS staff, our team and the staff had a roundtable dissection of the SLCA survey instrument. Issues with cultural translations, wording, and subtopics were addressed and changed if deemed necessary. For the workers, we evaluated fair salary and social benefits/social security. For the value chain actors, we evaluated promoting social responsibility. All employees surveyed were given the fair salary and social benefits/social security sections. Only managers were given the additional promoting social responsibility section. The promoting social responsibility section of the survey was more interview-based as it had more open-ended questions than the other two sections. We hired and trained a translator as about half of the factory workers did not speak English. The SWB team conducted the rest of the interviews with the employees who were fluent in English. We were given a factory tour which included a description of materials used and the production process. We conducted an ethnography of the factory throughout our tour taking notes through personal voice recordings and an occupational health and safety checklist we created.

For the community engagement portion of the project, the team purchased and donated ceramic water filters to two rural primary schools in Uganda. In conjunction to our team's installation, a SPOUTS staff member conducted their standard demonstration of water filter use and maintenance and a lesson on water-borne diseases. Logistic updates were discussed with SPOUTS leadership throughout the trip to secure future collaboration and overall success. A scope of work declaration was created to document these ideas and solidify a method for implementing future changes.

Conclusion and Recommendations

Due to the fairly recent end of our data collection in Uganda, our team is still in the beginning stages of data analysis and cannot make any conclusive statements or recommendations. Preliminary results from the consumer surveys show that a main benefit of the filter is that it does not need electricity. There are also accounts of the filter being economically beneficial by allowing people to stop buying bottled water and/or charcoal to boil the water. The filter seems to be time-saving as people do not need to boil water and then wait for it to cool nor take the time to purchase bottled water. Health benefits seem to be a reduction in water-borne disease for both adults and children.

Preliminary results from the fair salary portion of the SLCA shows that a main concern is the salary of the factory workers. The workers and managerial staff at the factory are concerned with the low wages compared to the increasing cost of living. SPOUTS managerial staff, while being empathetic to the salary plight of the workers, proclaim that due to the company still being in its infancy stages and still working towards economic stability, they cannot afford to have a pay increase at this time. Overall differences and uncertainties in future plans of salary increase between managerial and non-managerial staff should be addressed. This issue is especially pertinent as the company will most likely reach economic stability (i.e. will not have to rely on grants for day-to-day operation) within the next two years.

Preliminary results from the social benefits/social security portion of the SLCA show significant strides in their human resource policy within the past three years. The company enlisted an experienced human resource consultant to

appraise their existing policies who had worked with another ceramic water filter company in Cambodia. Notable enhancements were implemented in educational assistance, pay equity, and employee time-off. However, workers also expressed the need for a more comprehensive healthcare plan that covers dependents. An issue that seemed to be the bases of many of the transgressions in this topic was the exceptionalism of America's worker policies. Since the founders and the current CEO of SPOUTS were American raised and/or educated, many of their ideas on labor policy followed an American framework that does not translate well to Ugandan policy and culture.

Preliminary results from the social responsibility portion of the SLCA showed that most (if not all) managerial employees have joined the company due to a desire for applied social justice and a passion for sustainable solutions. The company sources materials mainly from Uganda and are actively working towards having all materials be sourced from Uganda or at least East Africa. Non-managerial workers are mostly from local areas. However, there is varying knowledge between the managerial staff of who is included in the supply chain decision making. There is also little to no knowledge of existing Ugandan governmental clean water initiatives and how the company fits into them. Lastly, there is little to no knowledge of what the company's stance and procedures are on their role in promoting social responsibility along the supply chain.

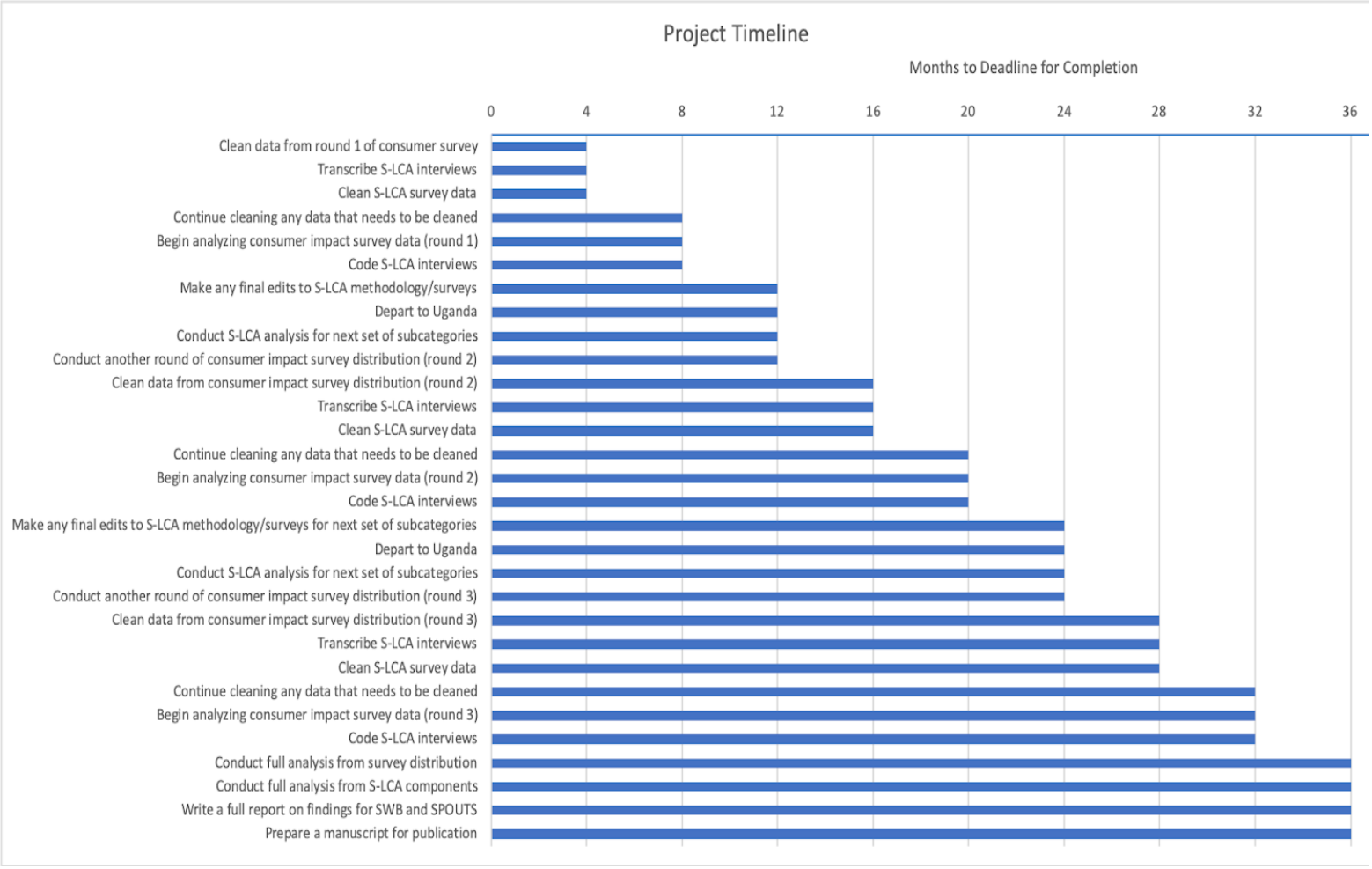
Preliminary recommendations are (a) the possibilities of non-managerial worker unionization should be discussed, (b) cultural humility training should be implemented, and (c) the company's board of directors and advisory board should be diversified in terms of race/ethnicity/nationality.

A lesson learned for our team is that our prior method of consumer survey data collection is not sustainable and should be changed. Difficulties in data collection included the instability of permanent housing for participants and participants (especially women) being known only by their honorary titles by other community members. GIS mapping of participants should help to rectify these issues.

Future topics for the SLCA will be on health and safety for consumers and workers, safe and healthy living conditions, contribution to economic development, and end-of-life responsibility. These topics will be analyzed over the next three years of the project. Our team will continue to tap into the many resources on campus who will continue to help us throughout the different aspects of our project, including the Center for Socially Engaged Design (C-SED), Survey Research Center (SRC), Ginsberg Center for Community Service and Learning, Consulting for Statistics, Computing and Analytics Research (CSCAR), and library specialists.

Team Members

Name	Academic Department & Degree Program	Education Level	Past Role	Current Role
José Alfaro	Center for Sustainable Systems, School for Environment and Sustainability	Assistant Professor of Practice	Faculty Advisor	Faculty Advisor
Fantasia Williams	School of Environment and Sustainability, Environmental Justice; School of Public Health, Occupational & Environmental Epidemiology	Graduate Student	Project Lead	Project Lead
Ebony Johnson	Department of Sociology; School of Public Health, Epidemiology	Graduate Student	Project Manager	Methods and Project Manager
Annalisa Wilder	School of Environment and Sustainability, Environmental Justice; Ford School of Public Policy, International Economic Development	Graduate Student	Data Analysis Team	Policy and Data Manager
Alexa White	Department of Ecology and Evolutionary Biology	Graduate Student	Grant Writing Lead, GIS Manager	GIS Manager
Quinn Favret	Ross School of Business, Business Administration	Undergraduate Student	Literature Review Lead	Business Model Manager
Addison Carr* *new team member	Undecided	Undergraduate Student		Data Analysis Team



Proposed Budget (See Below)

The amount of funding requested by the SWB Uganda team is $23,940. This funding would be utilized to allow 4 team members to travel to Uganda two more times to conduct additional rounds of the consumer impact survey and S-LCA interviews and ethnography. These visits will include stakeholder meetings and workshops to continuously access and ensure stakeholder buy-in, and address any necessary changes to the scope of work or proposed methods. In-country expenses such as lodging, transportation, incentives for survey participants, etc. have also been included. We would also like to be able to organize a community engagement project during each visit, to give back to the communities we are extracting data from. The projects may include but are not limited to additional school filter installations. Other expenses include professional graphic design and transcription services to protect the quality of data and to ensure a polished final product.

Alternative Budget (See Below)

The amount of funding requested by the SWB Uganda team is $11,140. This funding would be utilized to allow 4 team members to travel to Uganda one more time to conduct an additional round of the consumer impact survey and S-LCA interviews and ethnography. This visit will include stakeholder meeting and workshop to continuously access and ensure stakeholder buy-in, and address any necessary changes to the scope of work or proposed methods. In-country expenses such as lodging, transportation, incentives for survey participants, etc. have also been included. We would also like to be able to organize a community engagement project, to give back to the communities we are extracting data from. The project may include but are not limited to an additional school filter installation. Other expenses include professional graphic design and transcription services to protect the quality of data and to ensure a polished final product.

Proposed Project Budget		
Item	**Description/Examples**	**Cost**
Travel/Airfare	Round Trip Airfare to Uganda (4 Team Members) - August 2020, February 2021	$12,000.00
Visa	Cost of Uganda Visa (4 Team Members) - August 2020, February 2021	$440.00
Hosting/Meals	Hosting a working lunch with client/stakeholders (Kampala, Uganda) -August 2020, February 2021	$500.00
Travel/Lodging	Hotel accommodations during visits to client (Kampala, Uganda) - August 2020, February 2021	$2,600.00
Graphic Designer	Design services to produce a final project report and infrographic (consulting, page layout and design)	$1,500.00
Travel/Car Rental & Fuel	Rental vehicle to meet with project client/stakeholders outside of Kampala & transportation to and from SPOUTS factory (Namasagali, Uganda)	$1,000.00
In Country Communication Cost	Skype Credit, Uganda OTT Tax , Internet MiFi, MTN Voice & SMS Package	$300.00
Gifts	Incentives for survey participants (Soap)	$500.00
Supplies	(Pens, pads of paper, and other items for field surveying and enumeration Training)	$300.00
Transcription Service	Conversion of ethnography audio/video to text for qualitative theme analysis	$2,000.00
Printing Services	Provide copies of survey to enumerators	$200.00
Community Engagement Project	Including but not limited to purchasing and installing filters for schools in survey areas	$2,000.00
Enumeration Service	Distribution of consumer impact survey	$600.00
	Total Budget	**$23,940.00**

Alternative Project Budget		
Item	**Description/Examples**	**Cost**
Travel/Airfare	Round Trip Airfare to Uganda (3 Team Members) - August 2020	$4,500.00
Visa	Cost of Uganda Visa (3 Team Members) - August 2020	$165.00
Hosting/Meals	Hosting a working lunch with client/stakeholders (Kampala, Uganda) -August 2020	$250.00
Travel/Lodging	Hotel accommodations during visits to client (Kampala, Uganda) - August 2020	$1,300.00
Graphic Designer	Design services to produce a final project report and infrographic (consulting, page layout and design)	$1,500.00
Travel/Car Rental &Fuel	Rental vehicle to meet with project client/stakeholders outside of Kampala & transportation to and from SPOUTS factory (Namasagali, Uganda)	$525.00
In Country Communication Cost	Skype Credit, Uganda OTT Tax , Internet MiFi, MTN Voice & SMS Package	$150.00
Gifts	Incentives for survey participants (Soap)	$250.00
Supplies	(Pens, pads of paper, and other items for field surveying and enumeration Training)	$150.00
Transcription Service	Conversion of ethnography audio/video to text for qualitative theme analysis	$1,000.00
Community Engagement Project	Including but not limited to purchasing and installing filters for schools in survey areas	$1,000.00
Printing Services	Provide copies of survey to enumerators	$100.00
Enumeration Service	Distribution of consumer impact survey	$250.00
	Total Budget	**$11,140.00**

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