Document 531
Post-Monitoring & Evaluation Report

Chapter: Oregon State University
Country: Kenya
Community: Lela
Project: Lela Community Water Project

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Christopher Hinkle
Judy Jiang
Martha McAlister
Jeffery Randall (mentor)
Jaynie Whinnery (mentor)

October 12, 2014

ENGINEERS WITHOUT BORDERS USA
www.ewb-usa.org
## Post-Monitoring & Evaluation Report

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Post-Monitoring & Evaluation Report Part 1
– Administrative Information

1.0 Contact Information

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Chapter Name or Organization Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Lead</td>
<td>Martha McAlister</td>
<td><a href="mailto:kenya@ewb-osu.org">kenya@ewb-osu.org</a></td>
<td></td>
<td>EWB-OSU</td>
</tr>
<tr>
<td>President</td>
<td>Sonja Michelsen</td>
<td><a href="mailto:president@ewb-osu.org">president@ewb-osu.org</a></td>
<td></td>
<td>EWB-OSU</td>
</tr>
<tr>
<td>Responsible Engineer in Charge</td>
<td>Jeffery Randall</td>
<td></td>
<td></td>
<td>CH2MHill (retired)</td>
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<td>Traveling Mentor</td>
<td>Jaynie Whinnery</td>
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<tr>
<td>Faculty Advisor</td>
<td>Lewis Semprini</td>
<td></td>
<td></td>
<td>OSU</td>
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<td>Christopher Hinkle</td>
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<td></td>
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<tr>
<td>Assistant Health and Safety Officer</td>
<td>Judy Jiang</td>
<td></td>
<td></td>
<td>EWB-OSU</td>
</tr>
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<td>Education Lead</td>
<td>Martha McAlister</td>
<td></td>
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<td>EWB-OSU</td>
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<tr>
<td>Planning, Monitoring, Evaluation and Learning (PMEL) Lead</td>
<td>Judy Jiang</td>
<td></td>
<td></td>
<td>EWB-OSU</td>
</tr>
<tr>
<td>Community Contact</td>
<td>Paul Olang’o</td>
<td></td>
<td></td>
<td>Lela, Kenya</td>
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2.0 Travel History

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<tr>
<th>Dates of Travel</th>
<th>Assessment or Implementation</th>
<th>Description of Trip</th>
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<td>December 14 – 29, 2009</td>
<td>Assessment</td>
<td>Initial community and health assessment</td>
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<td>June 8 – 26, 2011</td>
<td>Assessment</td>
<td>Technical assessment for water source development</td>
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<tr>
<td>July 9 – August 3, 2012</td>
<td>Implementation</td>
<td>Construction of drilled well, rainwater catchment system</td>
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<td>June 10 – July 11, 2013</td>
<td>Implementation</td>
<td>Construction of drilled well, assessment of previous implementations</td>
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<tr>
<td>July 21 – August 17, 2014</td>
<td>Monitoring &amp; Evaluation</td>
<td>Follow-up of initial health assessment, monitoring of previous implementations</td>
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3.0 Travel Team:

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>E-mail</th>
<th>Phone</th>
<th>Chapter</th>
<th>Student or Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Martha McAlister</td>
<td><a href="mailto:kenya@ewb-osu.org">kenya@ewb-osu.org</a></td>
<td></td>
<td>EWB-OSU</td>
<td>Student</td>
</tr>
<tr>
<td>2</td>
<td>Judy Jiang</td>
<td></td>
<td></td>
<td>EWB-OSU</td>
<td>Student</td>
</tr>
<tr>
<td>3</td>
<td>Christopher Hinkle</td>
<td></td>
<td></td>
<td>EWB-OSU</td>
<td>Student</td>
</tr>
<tr>
<td>4</td>
<td>Jaynie Whinnery</td>
<td></td>
<td></td>
<td>EWB-OSU</td>
<td>Professional</td>
</tr>
</tbody>
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4.0 Health and Safety

4.1 Incident Reports
Did any health or safety incidents occur during this trip? ___Yes   _X_ No

5.0 Planning, Monitoring, Evaluation and Learning

5.1 Canceled/Non-functioning Projects
Has the status of any of this program’s past-implemented projects changed to Canceled or Non-functioning? ___Yes   _X_ No

5.2 Is the updated version of the 901B – Program Impact Monitoring Report included with this report? _X_ Yes ___No

5.3 Final M&E Trip For Program: Yes ___ No _X_
# 6.0 Budget

## 6.1 Project Budget

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<tr>
<th>EWB-USA TRIP BUDGET</th>
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<td>Oregon State University</td>
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<tr>
<td>Project Name ::</td>
<td>Lela Community Water Project</td>
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<tr>
<td>Type of Trip ::</td>
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<td></td>
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<td>BUDGET (PRE-TRIP)</td>
<td>ACTUAL EXPENSES (POST-TRIP)</td>
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<td>Travel + Logistics</td>
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6.2 Professional Mentor Team Hours

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<tr>
<th>Name(s) of Professionals Mentor (student chapters)/Technical Leads (professional chapters)</th>
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<th>During trip hours</th>
<th>Post-trip hours</th>
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<tr>
<td>1. Jaynie Whinnery</td>
<td>20</td>
<td>224</td>
<td>5</td>
<td>249</td>
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<td>2. Jeffery Randall</td>
<td>5</td>
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<td>5</td>
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7.0 Project Discipline(s): Check the specific project discipline(s) addressed by this project. Check all that apply.

**Water Supply**
- X Source Development
- X Water Storage
- Water Distribution
- Water Treatment
- Water Pump

**Sanitation**
- Latrine
- Gray Water System
- Black Water System

**Structures**
- Bridge
- Building

**Civil Works**
- Roads
- Drainage
- Dams

**Energy**
- Fuel
- Electricity

**Agriculture**
- Irrigation Pump
- Irrigation Line
- Water Storage
- Soil Improvement
- Fish Farm
- Crop Processing Equipment

**Information Systems**
- Computer Service

8.0 Project Location
**Latitude:** 1° 7’23.66” S
**Longitude:** 34°23’53.72” E
9.0 Project Snapshot for Publicity

9.1 Problem identification

In 2008, Lela community members identified the need for year-round access to safe drinking water.

9.2 Project goal

The goal of the Lela Community Water Project is to increase access to clean drinking water for all community members.

9.3 Project status

In 2012 a water well was drilled and a rainwater catchment system was installed at the local school. A second well was drilled in 2013. During the 2014 monitoring and evaluation trip, team members gathered data to make an informed decision about the future of the project. The team established that there is a need for additional reliable water sources in Lela and that community leadership has demonstrated responsible care and ownership of the existing facilities. EWB-OSU is planning an implementation trip for 2015.
Post-Monitoring & Evaluation Report Part 2
– Technical Information

1.0 Executive Summary

From July 21 to August 17, 2014, a team representing the Oregon State University Student Chapter of Engineers Without Borders (EWB-OSU) traveled to Lela, Kenya to monitor and evaluate the Lela Community Water Project (EWB-USA Project #5091). The project’s primary purpose is to provide a sustainable and dependable water source for domestic use in Lela, Kenya.

To date, representatives of EWB-OSU have traveled to Lela for two assessment trips, two implementation trips, and one monitoring and evaluation trip. As a result, the Lela community has increased access to drinking water via two wells and one rainwater catchment system. The purpose of the monitoring and evaluation trip was to assess whether the implemented systems are functioning as intended, and how the community’s access to potable water has been affected.

The primary audience for this evaluation is EWB-OSU. The chapter is using the results to make an informed decision about the next phase of the project. After two implementation trips, the 2014 monitoring and evaluation trip represents EWB-OSU’s commitment towards ensuring a sustainable solution to the needs described by the Lela Community Water Project. The Lela community has collaborated with EWB-OSU in all project efforts.

The Kenya Program was adopted by EWB-OSU in 2009. There have been no other projects within the program besides the Lela Community Water Project. Assessment trips were carried out in 2009 and 2011. During the first implementation trip in 2012, one well, named Lela A, was drilled, and a rainwater catchment system was installed at the Lela Primary School. A second well, named Lela B, was drilled in 2013.

The first priority of the evaluation was to collect data about well usage, public health, and relevant aspects of sanitation via household surveys. The travel team surveyed more than 60 households in order to obtain a statistically viable sample size for a robust evaluation. Other tasks completed during the trip include: water quality field testing, a physical systems inspection, a meeting with members of the Lela Primary School Management Committee, meetings with the Lela Women’s Water Committee (LWWC) and other community groups, a day-long observation at each of the wells, and the facilitation of a hydrogeological survey.

EWB-OSU does not plan to close out the Kenya Program at this point. The chapter will discuss the details of a third implementation trip during the next few months.

Since implementation of the wells Lela A and Lela B, Lela’s population has associated into somewhat distinct groups based on their proximity to a specific well. For example, the area containing users of Lela A has been dubbed “Lela A,” and likewise, the region surrounding Lela B has been dubbed “Lela B.” In anticipation of another well, a third group organized itself during the past year; they now call this area “Lela C.” Residents of Lela C are primarily represented by a prominent pastor and LWWC member, Pastor Samuel. Additionally, following the 2014 monitoring and evaluation trip, EWB-OSU received word that a fourth group has organized into
an area called “Lela D.” People living in this region have already met with members of the LWWC to discuss representation within the committee and methods of raising funds for a well in their area. To avoid confusion in this document, care will be taken to differentiate between the names of the regions and their respective wells. See Figure 1.0.1 below for an approximate delineation of the four regions based on information provided during the household surveys. Note that Lela D was just an idea during the trip; its borders could extend farther into the regions of Lela A and B if Lela D were to be associated with its own well in the future.

Figure 1.0.1: Lela regions by household
2.0 Scope and Scale of Completed Evaluation

2.1 Primary Purpose

The primary purpose of the evaluation was to understand the current situation and future trajectory of EWB-OSU's involvement in Lela, Kenya. The evaluation was conducted primarily through household surveys for the wells and a meeting with Lela Primary School teachers for the rainwater catchment system. The travel team used the survey data by comparing it systematically to the baseline survey data from 2009 in order to quantify and qualify any changes that may have occurred in the community as a result of EWB-OSU's partnership. Emphasis was placed on understanding which community members remain disadvantaged due to location. Data was also collected regarding the quality of drinking water provided by the implemented systems. The water quality results were compared to data collected during previous trips. Conclusions from the monitoring and evaluation trip will be used to make decisions regarding EWB-OSU’s future involvement with the Lela community. Related to this aim, factors under consideration include community-demonstrated transfer of knowledge, effective leadership, and financial stability.

2.2 Evaluation Scope

The scope of the evaluation encompasses the entire Lela Community Water Project, which includes two wells and a rainwater catchment system. The evaluation was intended to focus on three main aspects: (1) community water usage, (2) community satisfaction, and (3) sustainability in terms of funding, community support, and the physical condition of the water systems. The scope of the tasks carried out on the monitoring trip matched the three aspects of the intended scope. Community water usage was evaluated through household surveys and observations at the wells. The household surveys also provided an opportunity for respondents to comment on their level of satisfaction with the project. Additionally, the team gathered further testimony during community meetings. Sustainability, the third key aspect, was evaluated intensively by reviewing bank account statements, meeting with community leaders, observing daily activities at the wells, conducting household surveys, and inspecting the functionality of the water systems.

2.3 Evaluation Scale

The depth of evaluation met the intended scale as 62 household surveys were completed while the goal was 60 households. The survey questions were reviewed and revised in collaboration with the team’s translator, Paul Olang’o, prior to the trip and minimal changes were needed on site. Each survey took approximately 20-30 minutes. Although the travel team was unable to meet with all of the school teachers individually, a meeting was held with four representatives of the Lela Primary School Management Committee to discuss the rainwater catchment system. Topics of the discussion included tank use and management, student health and satisfaction, and maintenance.

The travel team carried out visual inspections of the water systems and conducted field water quality testing, but was unable to test water from all of the rainwater catchment
tanks because two of the four were empty. Also, a problem occurred when some water sample bags meant for shipment to a lab in Nakuru, Kenya were compromised during transportation. New samples were obtained and shipped to the lab at a later date with assistance from the community. EWB-OSU is awaiting the results.

Trip activities also included meetings with community leaders to evaluate the financial sustainability and management of the wells. A bank statement was obtained in order to review account history of funds collected for well maintenance. A three-hour meeting was held with the LWWC to review well management.

3.0 Evaluation Framework

3.1 Data Collection

Data was collected through the following methods: household surveys, meetings with community groups, physical system inspection, observation of water system usage, and water quality testing. All methods are described in greater detail below.

Efforts were made to conduct a household survey with statistical viability that could be easily compared to the baseline survey conducted in 2009. For the estimated population of 2,000, 60 samples were needed to ensure a 95% confidence level in the survey results, given an 80/20 split in answer variation and ±10% sampling error (Salant and Dillman, 55). The travel team obtained answers from 62 households representing a total of 555 community members. The pertinent questions asked during the 2009 survey were maintained in the 2014 survey. The survey also included open-ended questions and the opportunity for respondents to provide additional comments for quantitative analysis. Households were selected based on location and population density in an effort to include a representative number of houses from each area. The travel team used a handheld GPS device (Garmin Oregon 450) to obtain coordinates at each of the houses surveyed. All of the surveys were conducted in Dholuo, with the exception of two in English and one in Kiswahili. Paul Olang’o, as the translator, accompanied the team into all 62 households. Two members of the LWWC, Charles Olang’o and Pastor Samuel, were also present for a number of surveys. The survey questionnaire can be found in Appendix A.

The travel team held a meeting with members of the Lela Primary School Management Committee regarding the health of the school children and operation of the rainwater catchment system. Included in the meeting were the headteacher, deputy headteacher, chairperson of the School Management Committee, and one additional teacher. This meeting was held in English.

Community feedback was collected and recorded during community meetings and meetings with the LWWC. All parties were free to raise concerns and were similarly encouraged to offer solutions. These meetings were held in Dholuo with Paul Olang’o translating.
To evaluate system functionality, the team carried out physical inspections of each of the water systems. A copy of the well inspection checklist can be found in Appendix B. The travel team also spent a day observing both wells to collect data pertaining to well performance and usage. The number of well visitors, flow rate, strokes per liter, average bucket wait time, and total liters drawn were among the parameters recorded.

Field testing methods were used to collect water quality data from both wells, Lela A and B, and from two of the four rainwater catchment tanks. Unfortunately, tanks one and four (see Figure 3.1.1 below) were empty during the trip and could not be tested. The team used a Coliscan Easygel kit to detect fecal contamination, and a six-in-one test strip to evaluate pH, hardness, alkalinity, nitrate, nitrite, and chlorine levels. Further testing is being carried out at the Catholic Diocese of Nakuru (CDN) water quality laboratory in Nakuru, Kenya. Values obtained from this analysis will be checked against the Kenya Bureau of Standards (KEBS) and World Health Organization (WHO) standards for water quality.

![Figure 3.1.1: Rainwater catchment system naming scheme](image)

### 3.2 Results from Key Questions

The key questions addressed were:

How have the implemented systems affected the health of community members?  
How satisfied are community members with the implemented systems?  
Are the implemented systems functioning properly? What are common issues?  
What evidence exists to show whether maintenance is being done by the community?  
Is the fee collection system generating enough funds to ensure sustainability?  
How has the location of the implemented wells affected community dynamics?

See Appendix C for a table containing specific evaluation questions and their answers.
3.3 Household Survey Results

The following are some of the highlights from the household survey results. The corresponding question for each result can be found in Appendix A.

- 84% of the houses surveyed are within 1 km of Lela A or B.
- 45% of the houses surveyed are within 500 m of Lela A or B.
- The percentage of households that received health education in the past year rose from 49% in 2009 to 73% in 2014. (Question 2)
- The percentage of households using wells as their primary source of drinking water rose from 0% in 2009 to 79% in 2014. (Question 4)
- While those living in the Lela A and B regions all reported having year-round access to an improved drinking water source, only 9.1% did in the Lela C region. The total percentage of households that reported having year-round access was 82%. (Question 4.a)
- The average well management satisfaction level (on a scale of 1 to 10) was 7.8 for Lela A and 6.0 for Lela B. (Question 4.c.ii)
- 83% of well users can reach a well within 30 min. (Question 5)
- The travel team visually inspected household drinking water containers. 68% looked clean, 21% displayed light mildew, and the remaining containers displayed heavy mildew or were not available for observation. (Question 7.a)
- The number of respondents who wash their hands with soap rose from 63% in 2009 to 95% in 2014. (Question 9)
- Cases of diarrhea among children dropped from 22,000 per 100,000 in 2009 to 5,250 per 100,000 in 2014. (Question 10)

3.4 Results Presentation

Question 4.c of the survey (see Appendix A) was used to gather comments and suggestions from community members regarding the LWWC’s management of the wells. These comments and suggestions were shared during a meeting with the LWWC. Committee members discussed these issues and offered solutions with very little prompting from the EWB-OSU team. Other preliminary results from the surveys were communicated to the community during a meeting near the end of the trip and results from the water quality field tests were also shared. Results from the laboratory testing of the water samples as well as more-detailed results from the surveys will be shared with the community through local contacts Paul and Charles Olang’o, as well as professional mentor Jaynie Whinnery who is currently residing in Kenya.
The results of the evaluation have already influenced people living in the regions of Lela C and D to organize leadership and raise funds for a well to be drilled within their respective areas. This mobilization comes at least partially in response to testimony from current well users regarding improvements in their health and lifestyle. While noting some room for improvement, the travel team shared its satisfaction with the way the community has participated in the project. This in turn fostered an enthusiasm among community members to continue working productively with EWB-OSU.

4.0 Roles and Responsibilities

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<th>Task (listed chronologically)</th>
<th>Person(s) responsible</th>
<th>Anticipated date of completion</th>
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<td>Report authors</td>
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<td>Contact Ministries to organize workshops</td>
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<td>Organize meetings with LWWC</td>
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</tr>
<tr>
<td>Collect water samples for water quality testing</td>
<td>Travel Team</td>
<td>July 7</td>
<td>Yes</td>
</tr>
<tr>
<td>Observe Lela A to count number of users</td>
<td>Travel Team</td>
<td>July 10, 18</td>
<td>Yes</td>
</tr>
<tr>
<td>Observe Lela B to count number of users</td>
<td>Travel Team</td>
<td>July 11, 17</td>
<td>Yes</td>
</tr>
<tr>
<td>Conduct interviews with Lela Primary School teachers</td>
<td>Travel Team</td>
<td>July 15</td>
<td>Yes</td>
</tr>
<tr>
<td>Address 901B questions with LWWC</td>
<td>Travel Team</td>
<td>July 21</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete 60 household surveys</td>
<td>Travel Team</td>
<td>July 26</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete Document 531</td>
<td>Travel Team</td>
<td>Sept. 14</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete post-trip summary for chapter</td>
<td>Travel Team</td>
<td>Sept. 30</td>
<td>Yes</td>
</tr>
</tbody>
</table>

5.0 Difference Between Planned and Actual Evaluation

The first major change to the plan was the dates of travel. The mother of EWB-OSU’s community liaison, Paul Olang’o, passed away shortly before the start of the trip. Rachel Olang’o was a prominent community leader who, together with her husband Charles, hosted the previous EWB-OSU travel teams. To give the community time to mourn her passing, the trip was postponed. The subsequent rescheduling of the trip resulted in the travel team spending less time in Lela than originally planned. The original travel dates gave the team three full weeks
in the community, whereas the revised travel dates allowed for two weeks and three days. In order to maximize the time spent on monitoring and evaluation activities, the team decided not to arrange workshops for the community with the local ministries of Public Health, Water, and Gender and Development. EWB-OSU had originally hoped that the workshops would serve as a continuation of community education efforts carried out during past trips, but the task was not seen as absolutely necessary for reaching the goals of the monitoring and evaluation trip.

A task with high priority during this evaluation trip was to survey at least 60 households. In order to meet this goal the travel team decided to spend only one full day observing the two wells, rather than two days, which was the original plan. Although a second day would have yielded additional useful information, after the first day of observation the travel team decided that they had collected sufficient data. This allowed the team to exceed their goal by surveying a total of 62 households.

Other changes to the plan occurred as certain information was obtained during the household surveys. For example, during the surveys the team learned about alternative water sources to the two wells, Lela A and Lela B, which were previously unknown to EWB-OSU. It came to the team’s attention that some people were visiting a well at the Declaring our Victory is Emmanuel church (DOVE) just outside of Lela that was never mentioned during previous assessment or implementation trips. The team subsequently took time to travel to this well to gather more information and to obtain GPS coordinates. Similarly, the team visited other water collection points that receive frequent use by Lela residents, including a spring-fed watering hole, a reservoir, and open pit wells. See Appendix D for an image of Lela including these water sources.

Another change made to the original plan was the format of the teacher interviews. Though the travel team had originally planned to interview each of the Lela Primary School teachers individually, the timing of the trip coincided with the end of the school term when the teachers were busy administering final exams. As a result, the team decided to hold one meeting with the headteacher, deputy headteacher, chairperson of the School Management Committee, and one additional teacher. The team felt that this was an effective and efficient way to obtain information about the rainwater catchment system.

Although it was not a part of the original plan, the travel team decided to contact Mr. Okello of Operation H2O and arrange a hydrogeological survey for three locations in the Lela C region. The team decided that it would be an informative experience to witness Mr. Okello’s team conducting the survey, as all past surveys were conducted without members of EWB-OSU present. Additionally, the viability of drilling in the Lela C region must be known in order to make an informed decision regarding possible future implementations and the hydrogeological survey is a prerequisite for any well drilling in Kenya. The three potential well sites are shown in Appendix D, and are labeled Lela C1, Lela C2, and Lela C3.
6.0 Photo Documentation

Photo 1: Lock and chain on Lela A

Photo 2: Surface water where some residents still collect water
Photo 3: Long queue at Lela B

Photos 4 and 5: Conducting household surveys with translator Paul Olang’o
7.0 Lessons Learned

Health and Safety
During the travel dates in late July/early August, team members noted very few mosquitos; mosquito repellent was not usually necessary but bednets were still used at night.

Health and Safety
Team members frequently drank water from both wells, Lela A and B, without any post-treatment; water from both sources presented no negative side effects.

Health and Safety
Despite concern over security and terrorism in Kenya, the travel team did not find itself in any situation that felt insecure or unsafe, even during travel through Nairobi and Migori.

Health and Safety
Many team members suffered mild sunburn despite applying sunscreen, which may have been due to increased sensitivity to sunlight while taking the malaria prophylaxis Doxycycline.

Health and Safety
Anti-fungal cream was added to the medical kit because one traveler got ringworm. Travelers should be advised to avoid touching or petting domestic animals.

Travel
Team members should have packed more hand sanitizer.

Money
Withdrawing Kenyan shillings at Barclay’s ATMs was the easiest way to get cash. This should be done as soon as possible because cash is needed to pay for transportation from the airport.

Money
Most ATM or debit cards have a daily withdrawal limit. In the case that large sums of cash are needed during travel, an arrangement should be made to have the money transferred from the US through Western Union or Moneygram.

8.0 Project Status

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Implementation Continues</th>
<th>Monitoring &amp; Evaluation</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.0 COMPLETED PROJECT MONITORING

9.1 Completed Project Status Table

No projects have been completed at this time. However, components of the Lela Community Water Project were constructed to completion in 2012 and 2013. Their status is recorded in the following table.

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Project Discipline</th>
<th>Date of Completion</th>
<th>Functionality</th>
<th>Periodic Maintenance</th>
<th>Demonstration of Community Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>Source Development</td>
<td>07/09/12</td>
<td>75-100%</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Water Supply</td>
<td>Water Storage</td>
<td>07/09/12</td>
<td>50-75%</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Water Supply</td>
<td>Source Development</td>
<td>07/05/13</td>
<td>75-100%</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

9.2 Project Functionality Indicators

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Project Functionality Indicator</th>
<th>Monitoring Result</th>
</tr>
</thead>
</table>
| Water Supply     | Quality of the water at water point | Field testing results  
Lela A:  
- Sample One – 20 total coliform (not E. coli) per 100 mL  
- Sample Two – 0 total coliform per 100 mL  
Lela B:  
- Sample One – 20 total coliform per 100 mL  
- Sample Two – 0 total coliform per 100 mL  
Rainwater Catchment System:  
- Tank One – empty  
- Tank Two – 200 total coliform per 100 mL  
- Tank Three – 340 total coliform per 100 mL  
- Tank Four – empty  
Laboratory results are pending | 83% of well users surveyed can reach a well within 30 min.  
- Lela A: average time spent waiting in queue is 18 min  
- Lela B: average time spent waiting in queue is 147 min |
### 9.3 Periodic Maintenance Indicators

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Periodic Maintenance Indicator</th>
<th>Monitoring Result</th>
</tr>
</thead>
</table>
| Water Supply       | Existence of broken components                              | • Lela A: no broken components  
                     |                                                                | • Lela B: no broken components  
                     |                                                                | • Rainwater Catchment System:  
                     |                                                                |   ▪ gutter joints  
                     |                                                                |   ▪ missing wire mesh  
                     |                                                                |   ▪ tap on tank 4  
                     |                                                                | These components were repaired after the monitoring trip. However, the recently installed wire mesh covering the tank intake pipes was damaged during subsequent heavy rainfall. Alternative design solutions are being considered at this time.  
                     |                                                                | Level of cleanliness of water storage tanks  
                     |                                                                | Changes made to the as-built design of the rainwater catchment system (the removal of all first flush and overflow pipes, and drainage pipe for tank 1) have jeopardized the cleanliness of the water storage tanks. In response to these changes, the water purifier Aquaguard is now systematically added to each tank.  
                     |                                                                | Observed evidence of routine maintenance on the system done accurately without EWB-USA  
                     |                                                                | Lela B stopped working in February 2014 and again in September 2014 and was repaired within a few days using funds from the local bank account.  
                     |                                                                | The Lela Primary School Management Committee purchased Bondex to seal gutter joints and wire mesh to cover the holes where the overflow pipes used to be.  

Percentage of houses within certain distance of access point

- 84% of the houses surveyed are within 1 km of Lela A or B.  
- 45% of the houses surveyed are within 500 m of Lela A or B.
### 9.4 Demonstration of Community Capacity Indicators

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Community Capacity Indicators</th>
<th>Monitoring Result</th>
</tr>
</thead>
</table>
| Water Supply       | Balance available in maintenance fund                               | Wells:  
- 8,563KSH ($96) currently in local bank account.  
- Additional funds are stored in the village for use to be decided bi-weekly.  
- 9,800KSH ($110) was invested in a young bull (expected to sell for about 20,000KSH ($224)).  
Rainwater Catchment System:  
Very little money is available to the school. Some money is raised by parents, but this generally goes towards government fees. |
| Observed method of community members' storage of water          | During household surveys, the travel team visually inspected all drinking water containers:  
- 68% looked clean  
- 21% displayed light mildew  
- remaining water containers displayed heavy mildew or were not available for observation |
| Cost of water to user                                         |  
- 20KSH (about $0.25) per month for registered well users.  
- 5KSH per 20L bucket for non-registered well users.  
- Rainwater Catchment water is free for students and teachers. |

### 9.5 Additional Information

Shortly before the team’s arrival in Lela, chlorine dispensers had been installed at both wells by Evidence Action, an NGO. A few members of the LWWC had been trained by Evidence Action and spoke at length during a general community meeting about the importance of and how to properly use the chlorine. These chlorine dispenser “promoters” were also responsible for refilling the dispensers as needed.
10.0 Next Phase of the Program

The Lela Community Water Project will continue with the goal of increasing access to clean drinking water for all community members. EWB-OSU anticipates an implementation trip during the summer of 2015 with the following objectives:

1. Facilitate the drilling of one or two water wells.
2. Work with members of the LWWC to place the wells in locations that provide maximum benefit and equality within the community.
3. Organize educational workshops with the community to ensure proper operation and maintenance of the wells.
4. Monitor existing water systems.

11.0 Professional Mentor Assessment

11.1 Professional Mentor Name and Role

Jeffery Randall, Responsible Engineer in Charge (REIC)
Jaynie Whinnery, Traveling Mentor

11.2 Professional Mentor Assessment

Jeffery Randall’s Mentor/REIC Assessment:

As the Professional and Traveling Mentor on the 2012 and 2013 water supply implementation projects and the REIC on this post monitoring and evaluation report I fully understand the overall project and have a significant appreciation for the Lela Community. Based on my direct observation of the use and operation by the community of the existing systems and the results of this report, I fully agree with the recommendations listed in Section 10.0 above.

Jaynie Whinnery’s Mentor Assessment:

A monitoring and evaluation trip was a critical and necessary step for EWB-OSU at this point in the Lela Community Water Project. Prior to the trip there was uncertainty regarding how much the project had already addressed the needs of the community and whether the goals of the project had been met. While the community was already requesting an additional well, Lela C, it was unclear if another well was really necessary. The goal of the trip was to understand the current situation in Lela in relation to both the baseline and the goals of the project. While the information gathered during the trip clearly demonstrated the substantial positive changes that have occurred in Lela following the installation of the water systems in partnership with EWB-OSU, it also quickly became clear that the goals of the project have not yet been met.

For those households that are using the new water systems, the reported health and wellbeing has improved dramatically and in general people are satisfied with the management of the water systems. However, overcrowding was a serious issue at both
wells and was completely unacceptable at Lela B where some buckets were queued for more than three hours prior to being filled. Furthermore, there are still a large number of households that do not have access that meets or exceeds WHO recommendations. Specifically, the following goals of the project are currently not being met at a sufficient level of water quality: (1) access less than 500 meters away for all households, (2) at least one water point for every 250 people. While the quality of water provided by the wells is acceptable, many households located far away from the Lela A and Lela B wells reported using the same unsafe water sources in 2009 and 2014. In those regions it seemed that nothing has changed and it has been reported that people living in Lela C and (newly-mobilized) Lela D feel that they have been neglected. At the same time, the Lela community has shown great effort to manage and maintain the wells despite occasional issues. Under the given circumstances it is difficult to imagine a more motivated and enthusiastic group of people.

In my professional opinion, I think EWB-OSU should strongly consider an implementation trip to drill two additional wells at the same time. While one more well would be better than nothing, the community has demonstrated that it has the capacity to manage wells effectively and drilling two wells at the same time is much more cost-effective. The fixed cost associated with bringing an EWB-OSU team and the drilling team to Lela is large, while the additional variable cost for an additional well is relatively small. The added impact that could be achieved by an incrementally small amount of funding should not be taken lightly.

11.3 Professional Mentor Affirmation

Jeffery Randall’s Mentor Affirmation:

I acknowledge my involvement in the development of this post-monitoring and evaluation trip report and accept responsibility for the course that the project is taking.

Jaynie Whinnery’s Mentor Affirmation:

I acknowledge my involvement in the development of this post-monitoring and evaluation trip report and accept responsibility for the course that the project is taking.

Works Cited

Post-Monitoring & Evaluation Report Appendix A
– Survey Questionnaire

2014 Monitoring & Evaluation Household Survey

Interviewer(s): Date:

Respondent (male, female, other comments): Household Code (GPS):

1. **Number of household members by age & gender (including the respondent)**

<table>
<thead>
<tr>
<th>Pregnant</th>
<th>5 &amp; under</th>
<th>6-14</th>
<th>15-62</th>
<th>Over 62</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
</tr>
</tbody>
</table>

2. **Have you received health education or health messages related to water and sanitation (e.g. hand washing, water purification, defecation practices), in the community or at home, in the past year? (from clinic, community health worker, etc)**

   _____ yes    _____no    _____don’t know/not sure

3. **What region is your house in?**

   _____Lela A    _____Lela B    _____Lela C    _____other

4. **Where do you get your drinking water?**
   (check all that apply)

<table>
<thead>
<tr>
<th>Surface water</th>
<th>Bottled water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well (A or B?)</td>
<td>Rain water</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>

4a. **Do you get your drinking water from this source year round?**

   _____yes    _____no

4b. **If no:**

   i.  What months do you get water from this source?

   ii. What other sources do you use to get your water?
4c. If "Well" was selected:
   i. What problems have you encountered with the wells? (A or B?)

   ii. On a scale of 1 to 10, how satisfied are you with how the Lela Women’s Water Committee operates the wells? (Where 1 is completely dissatisfied and 10 is completely satisfied.)

   iii. What ideas do you have for improving the use and management of the wells?

   iv. How much money do you spend on water every month?

5. How long does it take you to collect your household water and drinking water each day? (Pick only one.)

<table>
<thead>
<tr>
<th>Time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30 min</td>
<td>0.5 – 1 hour</td>
</tr>
<tr>
<td>1 – 2 hours</td>
<td>2 – 3 hours</td>
</tr>
<tr>
<td>&gt; 3 hours</td>
<td>N/A</td>
</tr>
</tbody>
</table>

6. Do you do anything to purify your water before you drink it?
   ____ yes   ____ no   ____ don’t know/not sure

6a. If yes:
   i. What method do you use?

<table>
<thead>
<tr>
<th>Method</th>
<th>Water Treatment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>Boil water</td>
</tr>
<tr>
<td>Chlorine/other chemical</td>
<td>Solar disinfection</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

   ii. Why do you use this method?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Taste of water</td>
</tr>
<tr>
<td>Ease of use</td>
<td>Health/safety</td>
</tr>
<tr>
<td>Don’t know/not sure</td>
<td>Other:</td>
</tr>
</tbody>
</table>
7. **Show me the container where you store your water at home.**
   
   _____covered  _____uncovered  _____prefer not to answer

7a. **Do you clean your water container?**
   
   _____yes  _____no

   (observe:  _____looks clean  _____light mildew  _____heavy mildew)

7b. **Show me what you use to clean the container.**
   
   _____soap  _____no soap

7c. **Where do you clean your water container?**
   
   _____home  _____well  _____other

8. **Show me what you use to dip the water out of its container.**
   
   _____designated for clean water  _____multipurpose dipping device

8a. **Do you clean the dipping device? How?**
   
   _____yes  _____no

   (observe:  _____looks clean  _____light mildew  _____heavy mildew)

9. **Show me what you use to wash your hands.**
   
   _____soap  _____no soap

10. **In the past 2 weeks has your child <5 had diarrhea?**
    
    _____yes  _____no  _____don’t know/not sure

10a. **If yes: How often have they had diarrhea?**

    | Daily | 4 – 7 times |
    |-------|------------|
    | 12 – 14 times | 1 – 3 times |
    | 8 – 11 times | N/A        |
11. In the past 2 weeks have you had diarrhea? *(Gauge if it is appropriate to ask)*

   >>> yes >>> no >>> don’t know/not sure

11a. If yes: **How often have you had diarrhea?**

<table>
<thead>
<tr>
<th></th>
<th>4 – 7 times</th>
<th>1 – 3 times</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 – 14 times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 – 11 times</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Do you use a latrine?

   >>> yes >>> no

12a. If yes, can I see it?

   >>> nearby >>> far away

13. In the past month have your children experienced any of the following?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficult breathing</td>
<td>Fever</td>
</tr>
<tr>
<td>Convulsions</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Bloody stool</td>
<td>Cough</td>
</tr>
<tr>
<td>Malaria</td>
<td>Other</td>
</tr>
</tbody>
</table>
Well Physical Inspection Checklist
Lela Monitoring and Assessment Trip 2014

1. Check that flange bolts and nuts are tight (see diagram on page 2)
2. Check for missing parts
3. Check for any unusual noise
4. Check for corrosion of pump
5. Check if pump stand is shaky during operation. If shaky, the stand is loose in the foundation and contamination of the well can take place.
6. Check for leakage; carry out a Leakage Test:
   a. Operate the pump handle until water is flowing from the spout.
   b. Stop operating the pump handle for approximately 30 minutes.
   c. Then operate the handle and count exactly how many strokes required until the water is starting to flow again. If more than 5 full handle strokes are required to make the water flow again, there may be a leakage in the rising main or the foot valve. Leakage mostly occurs because of a worn bobbin or o-ring of the foot valve, disconnected rising main joints or perforated or cracked riser pipes.
7. Carry out a Discharge Test*:
   a. Operate the pump handle until a continuous water flow has been achieved (pump ratio approximately 40 full strokes per minute).
   b. Place a bucket in the continuous water flow for exactly one minute.
   c. Take the bucket from the water flow and check the amount of water drawn. The water collected should be generally no less than 15 litres (a typical bucket is 20-liters in volume). If the discharge is less than 10 litres for 40 full strokes, there might be a problem with the bobbins or the cup seal. Record the flow rate.
*This is a generalized test for Afridev handpumps. Results may vary slightly, but any significant deviations should be noted.
8. Check well pad area:
   a. Stagnant water near well? A: small amount B: no
   b. Excrement close to well? A: no B: no
   c. Other trash near well? A: cleaner than surrounding area B: same or cleaner
   d. Cracking in well pad / drainage channel? A: hairline cracks in wells B: some

Any issues discovered should be brought up with the LWWC. Contact Okello (Operation H2O, +254.072.494.1747) to discuss technical problems and repairs.

Further maintenance questions for LWWC:

- Is technical assistance available (can they contact Okello?)
- What is the maintenance performed on the well? Is this current system working?

### Post-Monitoring & Evaluation Report Appendix C

– Results from Key Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What percentage of community members are satisfied with the implementations?</td>
<td>96% of wells users surveyed are satisfied with how the LWWC manages the wells. This value is based on respondents’ answers to question 4.c.ii of the household survey.</td>
</tr>
<tr>
<td>What is the quantity of water available to the community members in dry season and wet season?</td>
<td>During the wet season, community members are able to satisfy most of their water needs by collecting rainwater. In the dry season, community members living closest to the wells are able to collect a sufficient quantity of water, but distance and overcrowding deny sufficient access to many others. At the Lela Primary School, the rainwater catchment system has sufficient capacity to store rainwater for use throughout the year.</td>
</tr>
<tr>
<td>Is the water safe to drink according to KEBS and WHO standards?</td>
<td>Laboratory water quality results are pending.</td>
</tr>
<tr>
<td>What percentage of households are within 500m of an improved water source (i.e., a well)?</td>
<td>45% of households surveyed are within 500m of Lela A or B. This value is based on GPS coordinates collected during the household surveys. It does not account for topography.</td>
</tr>
</tbody>
</table>
| What is the rate of flow at each water point?                             | Lela A- 13.3 lpm  
Lela B- 13.3 lpm  
These values were obtained during physical inspections conducted by the travel team. |
| How clean are the water storage tanks?                                   | Changes made to the as-built design of the rainwater catchment system (the removal of all first flush and overflow pipes, and drainage pipe for tank 1) have jeopardized the cleanliness of the water storage tanks. In response to these changes, the water purifier Aquaguard is now systematically added to each tank. |
| What is the cost of water per month for each user?                       | 20KSH ($0.22) for registered well users  
5KSH ($0.06) per 20L bucket for non-registered well users |
Rainwater Catchment water is free for students and teachers

<table>
<thead>
<tr>
<th>What funds have been utilized and are saved for maintenance of the systems?</th>
<th>Wells: 8,000KSH ($90) was used to repair Lela B in February. 4,000KSH ($45) was used to repair Lela B in September. 8,563KSH ($96) currently in local bank account. Additional funds are stored in the village for use to be decided bi-weekly. 9,800KSH ($110) was invested in a young bull (expected to sell for about 20,000KSH ($224)). Rainwater Catchment System: Very little money is available to the school. Some money is raised by parents, but this generally goes towards government fees.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there observable evidence of satisfactory maintenance of the systems beyond work done by EWB-OSU?</td>
<td>Lela B stopped working in February 2014 and again in September 2014 and was repaired within a few days using funds from the local bank account. The Lela Primary School Management Committee purchased Bondex to seal gutter joints and wire mesh to cover the holes where the overflow pipes used to be.</td>
</tr>
</tbody>
</table>
Post-Monitoring & Evaluation Report Appendix D
– Places of Interest