

# **Bluelab-Hagley Gap Progress Report**

## **Dow Distinguished Awards, 2015**

### **Project Scope**

Hagley Gap is a student-organized, faculty-advised project team that is under the larger umbrella organization of BLUE-lab. For several years, the team has been building a relationship with the rural community of Hagley Gap, Jamaica. This village is located in Jamaica's Blue Mountains and has about 5,000 community members, a large majority of whom are farmers. Due to its size, location, and the income level of its inhabitants, Hagley Gap gets little support from the government. This has led to the existence of many issues related to health, infrastructure, and water quality. A non-profit organization, the Blue Mountain Project (BMP), was founded eleven years ago and has been dedicated to remedying these issues, among others.

The goal of the BLUElab- Hagley Gap team is to engineer and implement sustainable technologies that can address some of the issues that are important to community members and that will have lasting impacts on their well-being. Over the years, we have worked closely with BMP to identify potential areas for development, and have built technologies in the community relating to water issues and classroom resources. During the 2014-2015 academic year, our team was divided into four subteams, each of which was dedicated to a different project focus. Six team members travelled to Hagley Gap in May, and this trip has helped us to modify our team's scope for the coming year. The team will be re-organized into subteams that will all work towards developing a large-scale solar dehydrator for the community. Our team is currently looking into pairing with students at two other schools that are also connected to BMP and would help develop a business plan for incorporating the solar dehydrator into the community.

Our vision for a large-scale solar dehydrator originated from observations during trips and conversations with community members. As previously mentioned, the majority of community members in Hagley Gap are subsistence farmers. Each week, farmers rise in the early hours of the morning and make the over two-hour trip down the mountain to Kingston to sell their crops at the market. Our team learned that the community often experiences a surplus in fruits (particularly mangoes), which results in piles of fruit being left to rot on the ground, and this led to the idea of building a solar dehydrator to address this issue.

### **Progress to Date**

The main progress that our team has made in the last few months has been in the form of key adjustments planned for this coming year (already outlined in "Project Scope") as a result of knowledge gained on our trip to Jamaica in May. Since team members were scattered across the country this summer, little technical work was done, but work is beginning to pick up now that we are back to having weekly team meetings.

The team had several design and research based goals for the May trip. For a detailed description of the trip, please see the attached travel document, but a summary of the main accomplishments follows. We

built a small-scale prototype of a solar dehydrator at the Minto Primary School in Hagley Gap. A teacher at the school is supervising extended testing during the school year to guide us in improving the design. The team also built portable chalkboards for several of the classrooms, upon request from the school leaders, and has given the chalkboard design specifications to BMP to pass along to other teams who can focus on this in the future. Additionally, the travellers had a group discussion with many of the school administrators and teachers to gauge their interest in the other projects we had been working on last year. Based on the feedback we got, we have decided to focus mainly on the solar dehydrator and education initiatives and dissolve the two other subteams (soundproofing and classroom resources) we had last year.

## **Future Plans**

Our team is not requesting any additional funding from the Dow Sustainability Program, however we do have very important goals for the coming year. We are working on scaling the initial dehydrator prototype for community-wide use. This technology would be incorporated as a business and be maintained by the community. Additionally, students at the local school will hopefully be able to use the solar dehydrator as a hands-on learning experience about solar energy. One long-term goal of this project is to incorporate a Maryland brewery into the business model as a source of income. BMP has made connections with this brewery, which could be a major purchaser of the dried fruit for use in their mango beer. As mentioned in “Project Scope,” we plan to contact two other schools who also work with BMP to discuss potentially joining together on this project.

This school year, our team is focusing on refining our projections for a full sized model and creating a scaled version of our initial prototype. We expect to bring a larger model of the solar dehydrator to the community in summer 2016, with plans for full production and final size by 2018. After this academic year and subsequent travel to Jamaica in the summer of 2016, we will reassess the feasibility and progress of this project. Success will be defined by the ability of the solar dehydrator to fulfill the community and producer’s needs in this venture. Also, we are defining success as the ability of the Hagley Gap community to maintain and operate the solar dehydrator on their own.

# MAY 2015



BLUELAB HAGLEY GAP TRAVEL SUMMARY

Key Highlights from BLUElab Hagley Gap's May 2015 Needs Assessment and Feasibility Testing Trip to Hagley Gap, Jamaica

## ABOUT THE TEAM

HAGLEY GAP HAS BEEN A STAPLE TEAM OF THE BLUELAB COLLABORATION SINCE 2008.

**T**he largest and one of the oldest teams in the BLUElab organization, we have forty members across many disciplines. From undergraduate to master's students, our team represents majors from all fields of engineering to information science to business and more. At least once each year, a small group of team members travels to Hagley Gap, Jamaica to transform our philosophies and ideas into designs which make lives better. We can't wait to share with you all we've accomplished and learned on our most recent trip in May 2015.



## TRIP OVERVIEW

SIX TRAVELERS FROM OUR TEAM WENT TO HAGLEY GAP JAMAICA FROM MAY 3RD, 2015 - MAY 13TH, 2015.

18.0167° N, 76.6167° W

HERE WE COME,  
JAMAICA!

## OUR COMMUNITY

WHAT IS HAGLEY GAP, JAMAICA LIKE?



**T**ravelers built whiteboards, soccer goals, and a small solar dehydrator while also teaching science and engineering lessons to the primary school students. They met with locals to perform a needs assessment and feasibility testing for a soundproofing mechanism and a zero-water composting toilet. The travelers enjoyed their time in the community working with the Blue Mountain Project (BMP), the non-governmental organization that our team partners with, and loved immersing themselves in the Jamaican culture.



View more photos at  
<http://bluelabhagleygap-may2015.blogspot.com/>.

**H**agley Gap is a rural community in the Blue Mountains of Jamaica, just a few hours drive from Kingston. It is a farming village known for the famous Blue Mountain Jamaican coffee, but farmers also grow a variety of fruits. The residents are all like family; there is virtually no crime in this close-knit community of about 3,000 people. The dialect is Patois.



## OUR PHILOSOPHY: A NEW ROAD AHEAD

MICHIGAN WOLVERINES DON'T JUST SETTLE FOR WHAT IS EASY. HERE'S HOW FORTY TALENTED UNIVERSITY OF MICHIGAN STUDENTS COMPLETELY CHANGED BLUELAB HAGLEY GAP'S MISSION TO BETTER SERVE OUR PARTNER COMMUNITY.

In the fall of 2014, our team took a bold step forward by moving backward. Over years, we had developed strong expertise in biosand water filters, organic water filters which use sediment and natural biofilm to remove contaminants, and had successfully implemented several in the community. We were thrilled to hear reports that traveling doctors from NGO's were even using our filters! However, our team was slowly realizing that the community, although initially excited and appreciative of the filters, was not integrating them into their daily life. While our scientific testing showed that the water in Hagley Gap was not at a sufficient level of cleanliness, the community members had gone without filtering the river

water for as long as they could remember. What we saw as a solution was a foreign technology that they did not need. Our team unanimously agreed to return to the beginning of the design cycle, despite the difficulty of starting fresh. Having learned a valuable lesson about cross-cultural engineering, we spent an entire semester researching and discussing with the community to really understand their lives and culture. After exploring several topics of interest, we turned our attention to the Minto Primary School. Education technology would be a huge challenge - how could we use engineering to make education better? And so we committed to bringing Hagley Gap the technology they wanted to see, right in the heart of their community.

## SUBTEAM REPORTS

EACH SUBTEAM HAD A UNIQUE FOCUS AND GOALS.



Our team has four subteams which you'll hear about: Classroom Resources, Education, Soundproofing, and Advanced Technology.

## EDUCATION

OUR SMALLEST SUBTEAM PLAYS A CRITICAL ROLE IN DEVELOPING FRIENDSHIP AND TRUST.

We formed an Education subteam this year to focus on strengthening our relationship with the community. Instead of simply plopping down a new technology every year, we wanted to involve the community and provide education around the work we were doing. This May, our travelers taught lessons to the Minto School students that would get them excited about science and engineering. Where the limitations of resources mean little opportunity for hands-on lessons, we made marshmallow towers and taught the students about stability and the trusses; we made goop and taught the students about chemical properties and states of matter; we made kazoo's and string telephones and taught the students about sound waves; we made cars out of recycled goods and had a car race down a ramp and taught the students about the engineering design process. The students loved the lessons! We plan to continue this tradition of fun lessons to create lasting memories in the community which show our investment in helping Minto grow.



## CLASSROOM RESOURCES

Our goal was to implement a sustainable project in the Minto classrooms that would make the classroom environment more interactive. We designed and constructed two whiteboards which could be customized to the teachers' wishes. Whiteboards were often brought up in conversation with the teachers - compared to the chalkboards that were previously in the classroom, whiteboards are easier to write on, easier to erase, and easier to read. With the ability to use different colored markers on the whiteboards, it is easier for the teachers to make their lessons more interactive. We received very positive feedback from the teachers, and the kids were extremely eager to write on the boards. We also constructed two soccer goals. During their lunch break, the students always go out into the schoolyard and play soccer together (or "football" as they call it). They used to use bamboo sticks to mark where the goal would be and were thrilled when we built goals with nets for them. These projects were a way for us to strengthen our relationship with the community and gain their trust. We often played alongside them during lunch break and had a blast!

## SOUNDPROOFING

IN A SMALL BUILDING WITH STUDENTS OF ALL AGES, WE SOUGHT TO REDUCE THE BACKGROUND NOISE.



The Soundproofing team used our trip to perform feasibility testing for a soundproofing wall that would make the classroom environment quieter and more conducive to learning. Currently, the classrooms are connected with dividers separating them, making noise a very big distraction for students. We took pictures, documented detailed notes, and spoke with the teachers and the principal about the project. We found some concerns during our feasibility testing related to the open doors and openings in the walls that are used for air ventilation. We look forward to further discussing the feasibility of the project with the full team.

## ADVANCED DEVELOPMENT

PILOTING IDEAS ON AN ACCELERATED TIMELINE, THIS TEAM HAS UNCOVERED A POTENTIALLY HUGE PROJECT MOVING FORWARD.



The Advanced Technology subteam was formed to give members a chance to propose their own ideas and accelerate testing for these ideas. This trip, the team conducted a needs assessment for a zero water toilet, which has shown the community is not yet ready for a zero water toilet. The team also built a small-scale solar dehydrator. In Hagley Gap, there are hundreds of mangoes that rot in the street because the community cannot consume the excessive amount of mangoes produced every year. In order to target waste reduction, we piloted a small-scale solar dehydrator that dries out the mangoes for preservation. We are still testing the feasibility of the project in the weather conditions of Hagley Gap, hoping to scale it into a social enterprise in the future so the dried fruit can be saved and sold at the market in Kingston.

# WALK GOOD, JAMAICA. MI LOVE DA VIBES!

EACH YEAR, WE LEAVE BEHIND DESIGNS AND NEW TECHNOLOGY TO BE OUTSHINED BY INNOVATION AND IMPROVEMENT THE FOLLOWING YEAR. BUT THE MEMORIES AND KNOWLEDGE EACH GROUP OF TRAVELERS TAKES AWAY IS TIMELESS.

**T**rip blogger Yiming Li speaks for the whole team when she says leaving the Gap is hard:

I can't believe how fast this trip flew by. It was so sad packing and cleaning up the computer room after we finished after spending so much time working together through the laughter and the tears. It was so rewarding seeing the kids getting excited about new projects we finished. We couldn't keep them away from playing with the football goals, writing on the whiteboards and helping with solar dehydrator testing! The people in the Gap are honestly the nicest people I have ever met in my life, and I can't believe now it is time to say goodbye. The students and teachers got us keychains, lanyards, and wrist bands.



WE WILL KEEP THEM DEARLY IN MEMORY OF THIS LIFE CHANGING TRIP.

## THANK YOU

TO ALL WHO MAKE OUR WORK POSSIBLE.



**W**e owe our gratitude to so many people who help make our work and trips a reality each year. Thank you to the sponsors of BLUElab, the Blue Mountain Project, and all of our wonderful members.

## STAY IN TOUCH

HEAR UPDATES ABOUT OUR PROGRESS THROUGHOUT THE YEAR.



**C**heck out our team's webpage at <http://bluelab.engin.umich.edu/hagley-gap.html>, our blog at <http://bluelabhagleygapmay2015.blogspot.com/>. We are also on Twitter (@BLUElab\_HG) and Facebook. For further questions about our team, contact Project Lead Connie Zuo (czuo@umich.edu) or Technical Lead Megan Bushlow (bushlowm@umich.edu). Thanks for reading, and we hope to hear from you!