

YEAR END REPORT 2018



ENGINEERS WITHOUT BORDERS USA
NORTHEASTERN UNIVERSITY CHAPTER

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Our Mission

EWB USA-NEU aids communities in developing countries by using engineering solutions to address basic human needs, such as the need for potable water – all the while supplying our student members with educational, transformative experiences.

Our Vision

EWB-USA's vision is a world in which every community has the capacity to sustainably meet their basic human needs.

From the President

Dear Friends,

2018 has been an exciting year of change and progress for EWB-USA NEU! In Uganda, we completed our final monitoring and evaluation trip to Bbanda, and have now fully shifted over to working on assessment in our new community of Nakyenyi. In Panama, we commissioned our water distribution system, and are now in the process of designing a new water transmission main to enhance water supply to Las Delicias. We also began work on our newest program, in Guatemala, where we are in the design stage for building a school in the community of Chuixil.

This year, nineteen students and four mentors traveled to our three partner communities on four trips. Additionally, student members attended the national EWB-USA conference in San Francisco, as well as 3 regional conferences. On campus, members work diligently to create designs, write reports, and raise funds for our projects. Our chapter has approximately 100 students attending weekly meetings. We also have an executive board of 18 students who ensure all facets of our organization run smoothly.

These successes are made possible due to the support system of our organization. First, I would like to thank our donors, who make it possible for our designs and hard work to become material resources for our communities. Thank you to our mentors, who provide time and



Emily bonding with a student in Chuixil

guidance through every step of the process, and impart engineering legitimacy to our student organization. Thank you to our student members and student leadership, who consistently put in the time and effort needed. Thank you to our partner organizations, who help facilitate the work we do. Finally, thank you to the communities of Bbanda, Nakyenyi, Las Delicias, and Chuixil for collaborating with us to create these partnerships and projects.

I cannot express how much we appreciate the support of all of our partners, and look forward to working with you all in the future!

Emily Malterre
President 2018-2019

Uganda

In December of 2017, the Uganda Program received news from the Bbanda Water Board that they had completed construction of two new Tap Stands with funds from a Korean NGO. The program originally planned on implementing these tap stands in the summer of 2018. Due to demonstrated community autonomy and the strength of the water board's financials, the students felt the community was ready to move forward without our direct assistance.

In April, the chapter decided to officially close the 10-year Bbanda project and adopt a new water supply project in Nakyenya, Uganda. Our chapter is partnering with the Buddu Social Development Association (BUSODA), an in-country Non Governmental Organization headquartered in Masaka, Uganda. In August, a team of 5 students, led by our Professional Mentors Tim McGrath and Bill Clunie, traveled to Uganda to start this new partnership. The team completed final monitoring and evaluation of the Bbanda Distribution System (BDS) and assessed the community of Nakyenya for a new water distribution project.

Upon arrival in-country, the team found that the extensive 2017 tank repairs had been successful, as the tank was not leaking water. This fix enabled the BDS to collect and save additional money, allowing for future expansion and repairs of the system. The team also learned that Bbanda

is being elevated to Town Council status, due in part to the success of the BDS. This organizational structure will give Bbanda more formal governmental oversight, and potential funding that can be used to maintain the BDS. The travel team was also pleased to hear that the Water Board had opened a bank account to store their funds, as they had previously been relying on cash. The Water Board provided the travel team with a report on their future expansion plans and have already begun to assess the costs and feasibility of their ideas.

The travel team officially closed the Bbanda project in August 2018 by signing an Acknowledgement of Completion with the Water Board. This agreement states that we will not fund any more construction but will continue to be available for remote technical support. Overall, the partnership brought Bbanda 11 tap stands served by a drilled well with a submersible pump and a 50,000 liter water storage tank, which serves 7 schools and over 1,200 community members.

The travel team spent the second half of their trip in the new EWB-USA NEU partner community, Nakyenya. Nakyenya is a community of approximately 1,400 people in southeastern Uganda. Similar to Bbanda's needs in 2009, Nakyenya is in need of accessible, potable water. Current sources are located up to three hours from people's homes, and are contaminated with coliforms and E.Coli.





High-fives all around in Bbanda

to determine the population and estimate water demand using data collected on the assessment trip as well as available national census data. The Alternatives Analysis confirmed the necessity to drill a source well. It also allowed the program to begin writing and designing components for the Pre-Implementation report due in August.

The Uganda Program is currently planning the first implementation trip for December 2019. This gives adequate time to complete an additional hydrogeological survey, design higher quality systems, and write a detailed and comprehensive Pre-Implementation Report.

With the success of the BDS, the Uganda Program is looking forward to utilizing all their knowledge and resources to complete thorough design work for mirrored success in Nakyenya on the horizon!

Article by Nicole Marco



Panama

2018 was a year of accomplishments for the Panama group. We completed two implementation trips and have running water at each tap stand in Las Delicias!

With the work that was done in the fall of 2017, our program was prepared to travel in March 2018. The second implementation trip of our program focused on phase 2 of the system in the lower half of the community. There was a lot we were hoping to get done on this trip: evaluating phase 1 construction, marking phase 2 of the system, building a river crossing, planning with the community, collecting data for a transmission main, and training the community on how to build the tap stands. Our design groups worked right up until the very last minute to make sure our travel team was prepared. The trip was successful and we got everything done that we planned.

With the transmission main data that was collected on this trip, our program focused on designing the source box and transmission main, looking at the water quality of nearby sources, and evaluating alternative methods to deliver more water. The community wanted to ensure the water distribution system could account for the large expected population growth. We also learned that there is not enough water flowing from an existing source to sustain the community during the dry season. This led to the conclusion that a transmission main from an additional source is the best method of gathering more water.

The fall was spent preparing to commission the system in December. This involved design and logistical planning, including researching disinfection methods, creating break pressure tank models, redesigning some internal piping and supports in the existing break pressure tanks, and organizing the flushing path of the entire system. Flushing of the system proved difficult due to a complicated system of valves to open and close to conserve water. The chapter learned about preparing the system to provide potable water, a process which consisted of high velocity flushing, chlorination, and a final flushing with valve throttling.



Water is flowing in Las Delicias!

Due to strong communication with the community, many tasks that needed to be done before chlorination of the system were done before the travel team arrived in Panama. These tasks included fixing and cleaning the break pressure tanks. In fact, the community reached out to us with

images of the break tanks before the trip. As a result, we were able to find design flaws and work with the community to fix them prior to arrival.

While in country, the team was able to clean the system in 7 days by connecting the existing storage tank to the new distribution system and then flushing, chlorinating, and throttling valves. This was a long process of routing the water throughout the system. The community learned how to flush the system as they worked with the team. Once trained, the community ended up completing many of these tasks on their own. The travel team also prepared for the next phase of the project by walking the future transmission main route and visiting a nearby town's source box.

Completing commissioning of the system with pressures between 15-85 psi and equitable flow rates was a culmination of all of the hard work completed by the program since 2015. It was amazing to see a system designed by Northeastern students and built by the community in collaboration with our NGO partner Sustainable Harvest International. At the departing ceremony, there was a celebration with all three partners coming together, including the

Water Board president of Las Delicias, an SHI representative, and the trip leader from Northeastern EWB.

Looking forward, we are planning on traveling in December 2019 to begin construction of the new water transmission main. Although the current system is functional, an increased water supply can sustain the community for 50 years and account for the dry season. Therefore, this next trip will consist of marking the path of the transmission main as well as building the river crossing and source box. Design groups in Boston are currently working on these subsections of the system. We are excited to see how we can continue working alongside Las Delicias to bring them additional water for generations to come!

Article by Lisa Sangree



Guatemala

When EWB-USA prevented travel to Honduras, members of the program began to search for new projects. After careful consideration, EWB-USA NEU applied to partner with the community of Chuixil located in the municipality of Joyabaj in the Quiche Department of Guatemala. The project involved construction of a schoolhouse and access road in Chuixil. After receiving approval in June 2018, the team immediately began preparing for a December 2018 assessment trip.

After a long history of water projects, the EWB-USA NEU program has committed to a structural project for the first time. An excited, dedicated group of students began laying the groundwork for travel to this new community. The first step entailed determining the procedures necessary to complete a remote geotechnical assessment sufficient to design a small schoolhouse.



Members of Chuixil digging test pits

The community of Chuixil has a population of approximately 200. There is an existing makeshift school comprised of improvised walls and a tin roof. This school currently serves approximately 40 children, a number expected to grow in the coming years. Members of Chuixil have been extremely vocal in expressing their desire for a permanent structure in which their children can obtain an education in a safe, comfortable environment. Our final design will incorporate a kitchen designed and built to local cultural standards. The project will also include bathroom facilities with modern flushing toilets and sustainable wastewater management. This would be a major improvement upon their existing community-wide system that discharges untreated water into a nearby ditch.

During our first assessment trip in December 2018, we collected soil data by digging test pits, performing USCS classifications, and evaluating plasticity and bearing capacity with the help of enthusiastic community members. We surveyed the project site to create a detailed topographic map of the project area. This data will be critical for designing foundation and drainage plans to account for the steep grade of the project location. We also visited and documented details of schools in the region that were designed and constructed by other EWB-USA chapters. Another major step was meeting the mayor of Joyabaj to sign the Community Partnership Agreement, where all stakeholders agreed

to the specifics of the project. Perhaps most importantly, we gathered demographic data through a questionnaire administered at a community meeting. Overall, this trip allowed us to start developing a positive relationship with both the community and the EWB office of Joyabaj. Together we can ensure our design will be based on community input and existing successful school designs. Construction on the project is scheduled to begin in December 2019, beginning with site regrading and construction of the foundation and walls. The community is ecstatic for the project to be underway. Our translator to the local K'iche' language, Cata, described our community as one of the most enthusiastic and helpful she has ever seen. Our chapter is extremely grateful to the community of Chuixil for welcoming us into their homes and extending the opportunity to work with them on this project!



The mayor of Joyabaj signs the Community Partnership Agreement

Article by Zachary Pierce





Senior Spotlight

Roisin Floyd-O'Sullivan

Every year, EWB-USA NEU highlights the story of one of our chapter's graduating members. Roisin Floyd-O'Sullivan (COE '19) is one of these dedicated members who is currently wrapping up her time at Northeastern. Roisin knew she wanted to be part of Engineers Without Borders before she even started touring colleges. When she learned that Northeastern's chapter had been named a Premier Student Chapter in 2014, she knew this was the school for her. Roisin proceeded to join the Uganda program during the first week of her freshman year in the fall of 2014. After gathering some experience, she was appointed as the Uganda Program Director at the end of her third year. She played an integral role in the successful close out of the Bbanda water project and the start of a new project in Nakyenyi. According to Roisin, "all of this included a couple of reports and organizing a close-out and assessment trip, it was a lot of work, but I miss it!"

Aside from her hard work on campus, Roisin has fond memories of traveling to Bbanda, Uganda in May of 2017 to repair a water distribution tank. After preparing for a small-scale solution to the problem, she and her team discovered a much larger repair was needed. Working together with Tim McGrath, the mentor for Uganda, they adapted to the situation and worked hard to rehabilitate the system. "It was an incredible, chaotic experience and I'm so thankful for the people I met [and] the



Roisin making friends in Bbanda in 2017

travel team members who are some of my closest friends," says Roisin. She had the opportunity to stay in the heart of Bbanda, where she was able to experience the local food, interact with community members, and go to the local church. "One of my favorite moments from the trip includes when we were walking up Bbanda Hill to the tank and some of the children who knew me came running down the hill screaming 'Nanteza!' (my Ugandan name)," Roisin recalls. All these amazing experiences allowed Roisin to develop as an engineer while making great memories throughout her five years at Northeastern. She plans to join EWB Boston Professionals after graduation. Looking back, Roisin is "excited to see the growth of our organization, from two programs when I was a freshman to four different ones when I graduate, and new types of projects too! I am glad to have been a part of the growth and I will greatly miss my time here."

Article by Rishi Shah

National Conference

On November 7th, six EWB-USA NEU members caught a flight to San Francisco to attend the 2018 EWB-USA National Conference. Students and professionals congregated from across the globe to support the mission of Engineers Without Borders.

The two-day conference featured presentations by EWB-USA staff, student chapters, professional chapters, and a keynote by Dr. Menzer Pehlivan, a geotechnical engineer who is intent on breaking the mold. Dr. Pehlivan grew up in Turkey, where she was discouraged from pursuing higher education as a woman, especially in the engineering field. Menzer shared her empowering story of getting a degree, pursuing a PhD in engineering in the U.S., and starring in the film “Dream Big: Engineering Our World.” Her message was that anyone can become an engineer, and that we must continue to dispel the stereotypes which so often define us to the rest of the world, harmonizing with the conference theme of “Engineers Unlock Potential.”

The conference also featured a presentation from EWB-NEU President Emily Malterre and past Guatemala Design Lead Matt Burmeister. They spoke on internal organization strategies and the best practices that allow the Northeastern Chapter of EWB to achieve high levels of success. Among other things, they touched upon how to transfer knowledge between entering and exiting students. They also

spoke about the methods EWB-NEU uses to maintain both student and community engagement through events like Bootcamp and the annual Donor Reception. The presentation generated significant interest from other student chapters and EWB-USA representatives. Matt and Emily recently provided their presentation materials and video interviews to EWB-USA to be used in a new E-learning course!



EWB-NEU conference attendees in San Francisco

EWB-USA 2.0, which was introduced in early 2018, is being implemented smoothly. EWB-USA representatives were available to explain their goals and accept feedback from student chapters throughout the conference. One of their biggest goals is to focus on the development of in-country support offices. EWB-NEU will be working with two in-country offices recently opened in Guatemala and Uganda. The EWB-NEU team was fortunate enough to meet Tatiana Maldonado, the head of the main EWB office in Guatemala. Fostering this connection will allow our Guatemala Program to have

access to more resources as they approach the construction phase. The team also met members of several other chapters who were implementing similar school construction projects in the same region of Guatemala.

Back in Boston, the attendees were able to share what they learned with the other members of the Chapter and answer questions about the national organization. We look forward to sending more members and presenters to attend the 2019 conference in Pittsburgh!

Article by Matthew Burmeister

Regional Conferences

In February, a group of seven Northeastern EWB members attended the second annual New York City EWB conference hosted by Columbia University. The Columbia Conference interlaced different chapters in the northeast to consider the topic of building community. There was much sharing of ideas and advice between chapters. For example, other chapters inquired about the successful fundraising and industry connections maintained by the Northeastern chapter. There were also speakers such as Matt Sisul, the second president for the New York Professional chapter. He described engineering for developing communities in the context of planning monitoring, evaluation and learning (PMEL). At Northeastern, PMEL groups incorporate these ideas to inform surveys and field and qualitative data collection. Maria Dulin, a member of the Guatemala program, expressed how she enjoyed seeing EWB on a larger scale. She also emphasized how EWB is building a community that is both physical, in the sense of infrastructure, but also a community of people.



Maria Dulin (second from left) participating in a discussion at Columbia

Another regional conference that students attended in the past year was the UConn Conference. Nicole Marco and Peter Botticello, the leaders of the Uganda program, presented at UConn on closing a long-term project and ensuring sustainability of a water system. They also had the opportunity to learn about boreholes from a geologist, about pipe fittings, and effective social surveying. Regional Conferences such as these enrich the experience for students while fostering collaboration with other EWB chapters.

Article by Lea Rygg

Bootcamp!

Since 2012, Bootcamp has been one of EWB-USA NEU's signature events. Every fall, new and existing members spend a day learning how EWB projects work from start to finish. On October 20th, almost sixty students came to Bootcamp to collectively simulate assessment, design, and implementation. New members were split up into small groups and led by experienced members who facilitated and guided the students through the activities.

Bootcamp began with an insightful presentation on gravity-fed water systems by past president and veteran member Maria Franko. Uganda program leaders Nicole Marco and Peter Botticello continued with a presentation on the current water project in Nakyenyi and on the assessment phase. Students were then guided through an assessment activity involving two parts: brainstorming and simulation. Participants first brainstormed to determine what information should be collected during the assessment phase before simulating a fictional trip. The activity highlighted the importance of prioritization and preparedness necessary for travel.

The event continued with a presentation by Guatemala Program Director Zach Pierce on the new school structure project started in Chuixil. Past Design Lead Matt Burmeister described design phase activities before teams began an alternatives analysis activity using data gathered during the assessment simulation. Zach also gave a detailed "Intro

to Hydraulics" presentation. Students gained the technical tools necessary to perform calculations for a hypothetical gravity-fed water system, draft feasible design alternatives, and practice technical skills.

In the afternoon, Matt Burmeister presented on technical writing to prepare students to contribute to the reports necessary at each project phase. Past Panama program leaders Reed Allen and Max Heudebourg led students through an overview of the Panama project and the implementation phase. Students then worked through an engaging online simulation to experience what implementation is like in-country. The event was rounded off by an intriguing PMEL presentation by Sonam Katira, outlining the importance of maintaining projects and community partnerships throughout their lifespan.

Enhanced participation and sharing of experience, knowledge, insightful questions, and enthusiasm was visible throughout the event. With renewed motivation and further understanding of the purpose and challenges of Engineers Without Borders, our students are better equipped to continue the impactful work being done by our organization. We move forward with fresh inspiration to achieve greater accomplishments in the future and thank all who participated in making Bootcamp a success!

Article by Rishi Shah



Members learning and collaborating during Bootcamp!

Alumni Spotlight

Brandon Hornak

Northeastern's Chapter of Engineers Without Borders (EWB-USA NEU) has a lasting impact on its members. For many, this organization is formative and integral to their undergraduate education. Northeastern University alumnus Brandon Hornak (COE '17) is one such individual. Brandon identified with EWB-USA NEU as early as the summer before his freshman year during his engineering orientation. He even decided to pursue civil engineering solely to bolster his role in the club. Brandon worked primarily with the Honduras program and served as Program Director during the implementation of water distribution projects in El Carrizalito

and Los Oteros. He also served as the group's Vice President of Development and worked with donors to make EWB-USA NEU's mission a reality. "These roles advanced my professional development by providing strong leadership opportunities early in college, which of course is one of the amazing things about Northeastern," says Brandon. Serving as trip lead three times in Honduras, he learned to shoulder the responsibility of making important decisions as well as the preparation and problem-solving required of successful travel.



Student travel experiences are often enriching not only professionally but also personally. The excitement of being in a new country and forming relationships with community members inspired Brandon. He also emphasized the teamwork critical during challenges such as meeting construction deadlines, managing material mis-deliveries, and navigating unexpected rainstorms. Looking back, Brandon expresses gratitude for the opportunity to work with like-minded peers and make a difference in people's lives. "Everyone is there to do right by their neighbor and build something that ultimately makes everyone's lives better" claims Brandon, "and they bring a passion and a work ethic with them that you can't help but admire." One of Brandon's favorite moments was on his first trip in December of 2014. During a Christmas Eve meeting with the community, he remembers hesitantly asking the community members to help dig the final trench that would connect the tank to the main distribution line. Since work had to be completed on Christmas Day, he only expected three or four people to come help. However, when the team arrived at the site the next morning, more than 20 community members were already waiting and ready to help! "I think that was the best Christmas present any of us had ever gotten," remembers Brandon.

Brandon's involvement with EWB lasted throughout his five years at Northeastern and continues to this day. He is currently leading an EWB alumni team focused on the completion of the Ocotol water project in Honduras, with the support of NGO partner ACTS Honduras. The Honduras program was transitioned away from the Northeastern student organization

last summer but the alumni team is making swift progress. "We have been working on organizing our new group, transitioning information from the student group, and raising our own funds. We are on track to go on our first trip to start implementation in May 2019 where we will build out the source area for the Ocotol and Potrerillos water project," explains Brandon. The Honduras program is clearly in good hands and the community of Ocotol should soon see implementation of their long-awaited project.

Brandon is currently working as a Site Acquisition Associate at BlueWave Solar and helping build utility-scale solar farms across Massachusetts. His role allows him to help people who don't have rooftop solar panels take advantage of solar opportunities and support renewable energy in their community. Brandon sees a similarity between EWB and BlueWave in the sense that both organizations provide access to resources while also promoting a sustainable future. He strongly believes that EWB played a major role in his development as an engineer and citizen. He exemplifies the long-term impact EWB has on its members. Brandon concludes that EWB has "shaped the personal mission for which I hold myself to and has put me down a career path that reflects those same ideals. I consider it the most influential part of my college career in many ways."

Our Partners

Each one of our design programs partners with an organization that works in the same region we do. They assist our work in-country and facilitate communication throughout the year. Our work would not be possible without them and we would like to thank them for everything they do!



Sustainable Harvest International's (SHI) mission is to preserve the environment by partnering with families to improve well-being through sustainable farming.

SHI supports our Panama program.

The mission of the Buddu Social Development Association (BUSODA) is to help communities in the Masaka area of Uganda strive for their survival, growth and development.



BUSODA supports our Uganda program.



The Guatemala field office of EWB-USA currently works with communities on more than 60 projects in Guatemala, with a combined estimated reach of 125,000 beneficiaries.

The Guatemala field office supports our Guatemala program.

Financials

Revenues

Corporate Donations	\$21,250
Personal Donations	\$24,420
Grants/Awards	\$21,700
Student Contributions	\$1,163
Other	\$946
TOTAL	\$69,479

Expenses

Honduras	\$4,699
Guatemala	\$7,964
Panama	\$29,298
Uganda	\$13,261
Student Betterment	\$5,914
Administrative	\$175
TOTAL	\$61,311

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