

# **Women's Aquaculture Cooperative Program: A Humanitarian Project through Journeyman International**

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The Women's Aquaculture Cooperative Program (WACP) is a partnership between the humanitarian platform Journeyman International (JI) and the African energy company Afritech Energy, who aims to provide sustainable, affordable energy to the most remote regions of Africa. The WACP is in the Bihongora region of Rwanda, which currently has no electricity or infrastructure. Afritech plans to build the 5,000 kW Bihongora Hydroelectric Power Plant and create Lake Bihongora in order to power and operate the aquaculture. The project will provide women in the region with the education needed to fully run, operate, and profit from the aquaculture "micro-business." The project consists of building an access road, hatchery, cleaning facility, cold storage, fish pools, and community center. The design and preconstruction work done by the JI team will be used to secure fundraising and approval of the project. This process has provided an opportunity for interdisciplinary teamwork and exposure to the challenges that architects and engineers face when trying to deliver a sufficient design based on nothing but a conceptual idea. Cultural and geographic considerations had to be constantly reevaluated, and were major elements that affected the scheduling, estimating, constructability, safety, and site logistics of the WACP.

**Key Words:** Aquaculture, Rwanda, Journeyman International, Humanitarian

## **How the Project Came About**

I first learned about the opportunity to complete my Senior Project through Journeyman International while in the Senior Project Methodology CM 460 class. Daniel Wiens, founder of JI, came in to speak to the class regarding the experience. I was immediately intrigued by the chance to put my efforts towards a Senior Project that is tangible and could change lives, so I contacted Daniel via email and submitted an application through the JI website. I also reached out to another student who completed his Senior Project through JI, Randy Cordova, to learn more about the program. Daniel accepted me into JI and then began the process of choosing a project and design team. All the students in the Cal Poly branch of JI met up one day to discuss possible projects, of which there was a good selection to choose from across many different nations around the world. Daniel and the full-time JI team have done much of the ground work connecting with possible clients and humanitarian needs that are in need of the student designers that can create high-quality designs at little to no cost, greatly increasing the chances that the project will actually be funded and built. I was connected with Isha Chhabra (5th Year Cal Poly Architect) and Dennis Johnston (5th Year Cal Poly Architectural Engineer) on the Women's Aquaculture Cooperative Program in the Bihongora Region of Rwanda.

## **Process**

Once the project was chosen and the project team set, the design of the project began. For the first two quarters of the design process, I took on a more advisory role. I consistently met with the project team to discuss the design, provide constructability reviews, help make decisions on materials and function, and determine the needs of the owner. To accomplish this, I researched local construction materials, reached out to local contacts, and had meetings with our JI team's mentorship company, HGA Architects. Once the design was completed, the Construction Documents were turned over to me so that I could complete my deliverables, listed in the "Deliverables" section below. Looking ahead to the future, my deliverables will be integrated into the design team's handbook, which will then be used to secure the necessary funding for the project. The plans created by the JI team will be turned over and approved by local professionals, and then be constructed and operated. The project will create education, job training, and a viable business for women in the area. These women may be able to provide a salary and proper nutrition for their families for the first time because of the WACP. As of June 8th, 2017, the project team learned unofficially that funding for the project has been secured.

### **New Knowledge**

This process showed me a different side of the design process than I have ever been exposed to, having gained all of my experience from the perspective of a General Contractor. I was able to see more clearly the relationship between the owner, architect, and engineer, and realize the problems that each entity faced when undertaking the design process. I have gained more respect and sympathy for architects that have to create a design based on nothing more than an idea. For us, limited communication with the owner in Rwanda compounded these issues, and the project team would often work for weeks on aspects of the project that would then change the next time we talked to the owner.

The interdisciplinary nature of this project was a realistic representation of the flow of work for a normal project. The way the architect designed the project, with some input from the engineer and contractor, was typical of a design-bid-build project. I also saw the project team taking on traditional roles, with all of us thinking more about our respective roles and responsibilities in the project, and I was able to see how that affected our decision process. For example, the architect was very concerned with the way the project tucked into the steep slope of the site, while the architectural engineer was concerned with the loads created by having a walkable green roof, and I was concerned with the availability of materials, equipment, and labor.

The international aspect of the project was also new knowledge gained through this project. Trying to estimate costs, productivity, durations, etc. in a foreign country is a difficult undertaking. There is no real way to ensure accuracy, no historical cost indexes to base my estimate upon. The best I can really do is ballpark estimates and focus more on trying to think through every small object that can add costs to the project. I may not be able to provide specific costs for things, but I can provide accurate quantities and bring attention to the means and methods needed for the construction of the project. Beyond that, there were multiple times when I was reminded how cultural and geographical considerations affected the design of the project. For example, gabion walls infilled with volcanic rock became a main building component in our project, since volcanic rock is an extremely abundant and affordable local material. However, there is a local stigma surrounding volcanic rock as the "poor man's" material, and we received some pushback when we considered the volcanic rock gabion walls. The rock is usually stacked in haphazard piles that constitute walls, and do not look particularly elegant. We had to ensure that our design for the gabion walls looked aesthetically appealing enough to overcome this stigma while providing us with a practical building component.

### **Deliverables**

The deliverables I have created for the WAPC are as following:

- Area Map
- Project Schedule
- Construction Schedule
- Quantity Take-Offs
- Conceptual Estimate
- Storm Water Pollution Prevention Plan
- Hazard and Risk Mitigation
- Feasibility and Utility Analysis

### **Lessons Learned**

Overall, I feel that our design team worked well together, but one thing I wish I would have done better is setting more concrete deadlines for the information that I needed. The construction documents ran multiple weeks late and forced me into a time crunch for some of the deliverables. It wasn't unexpected for the design to run long, but I do wish I had pushed to get certain things done. Some of my deliverables are based on my best guess for what the design will end up being, because I don't have enough information to be completely accurate as of now.

### **How to Apply Lessons Learned**

Though I do wish I had more time on some of the deliverables, I was part of an interdisciplinary team, and that means there will always be give and take. I was able to prioritize my work and figure out which deliverables I could complete without having the complete design finished. In this way, the work was still manageable and I was able to get everything done. I realized how busy my project team was with school and other responsibilities, and I knew that they were always trying their best to give me what I needed. I can apply this level of understanding to the construction industry in order to facilitate a healthy, productive project team.

## Reflection

I learned a great deal through my experience doing this Senior Project. I am thankful to have been able to gain real world experience while creating a tangible project that has the opportunity to change the lives of people in impoverished conditions. I had a very positive Senior Project experience and it will be something I carry with me the rest of my life.

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