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African Water:

An experience with project management in Bulima, Tanzania

Honors Thesis

Lee Honors College

Western Michigan University

Robert Sharp

12/06/2010

During the summer of 2010 I had an opportunity to work in Bulima, Tanzania at The Lion of Judah Academy as the Assistant Director. The Lion of Judah Academy is a Christian Boarding school located on the southeaster shore of Lake Victoria in Africa. The school was started in 2001 by Hart and Lynn Inlow (an American couple) and by Josephales and Pili Mtebe (a Tanzanian couple). Mtebe is the current director of the school, his wife is one of the head teachers (principle), and Hart and Lynn live in the United States raising money to support the school. When the school started there was 14 students and 4 grade levels. Currently there are 400 students and 12 grade levels. Of the 400 students around 150 are boarding students and the other 250 are from the local village.

My initial project for the trip was to help plan for the continual growth of the school as it looks to add Form 5 and 6 within the next year and in the future add a technical school, Teachers College, and eventually a University. The school system in Tanzania is as follows: Awaili (kindergarten), Standard 1-7 (Elementary), Form 1-4 (High School), Form 5-6 (College Prep), and finally either Teachers College or a University. A student would only take Form 5-6 if they are planning on going to a Teachers College or a University. It is very common for a student to not make it through Form 4 because of family situations, not having money to pay for school, or having to work to support their family. Also, education currently is not highly valued in Tanzania which makes it easier to pull students out of school to work.

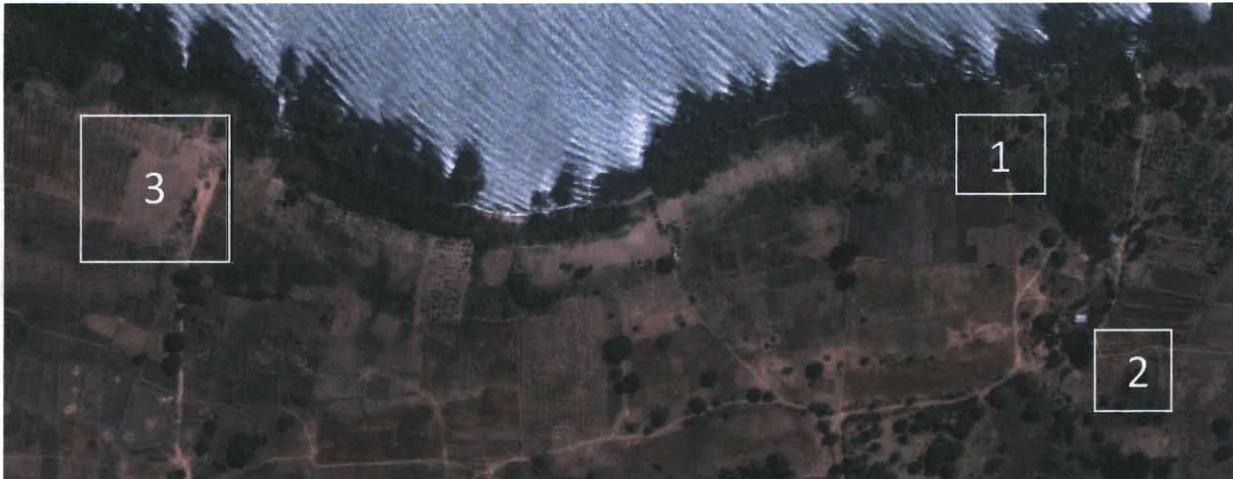
Two weeks before I was set to leave, I received an email from Hart informing me that the current water shortage at the school was increasing and what they were going to need me to work on would be the research, design, and implantation of a water system for the school and portions of the local community. This would mean that the focus of my honors thesis which was to be about the expansion of the school would need to be shifted to focus on the water system the school needed. While this would mean that some of my research leading up to the trip would need to be set aside, I was excited to tackle this project. This project would allow me to see more of the business side of Tanzania

and would allow me to see how project management techniques work in a different culture. It also would give me a chance to work in a project management role in a different country. With these new changes in mind I left the United States on May 12th and after all my travels made it to the school in rural Tanzania on May 15th.

Once I was at the school the Director wasted no time in bringing me up to speed on the water project (the school is using the name “water project” to refer to the new water system), the new things at the school since I was there last year (I spent six weeks at the school during the summer of 2009), and all the other projects that the school was working on or would be starting. The other projects the school was working on were finishing a new boy’s dorm that will sleep 100 students, a new chapel, a form 5 and 6 building, two new teacher’s houses, and starting to grow their own food for the boarding students. Having explained everything that was going on at the school, the director informed me that he would be handing the main responsibility of the water project over to me so that he could focus on the other projects going on at the school and the daily operations of the school. My goal now was to analyze where the best place to draw water from the lake would be, how to draw water from the lake, what type of pump should the school get, what types and sizes of pipes should be used, where the water tank should go, where to buy all the supplies, and all other aspects of the water system’s design.

Located in the appendix is Figure 1 and Figure 2. Figure 1 is an image taken from Google Earth that shows the general area around the school. Figure 2 is a close up image of the main school grounds, that has the building labeled.

My next task was to get from the Director all of the information that he currently had about the water project and to see all the options that we had for where to put the pump and tank. The three different spots where we could put the pump are labeled in the picture below. They are labeled in order based on the most favorable option when I arrived at the school.



Each spot had its advantages and disadvantages. Spot 1 was close to power (power is a huge issue there because the government does not provide power poles, the individual person who wants them must pay to have them installed, so getting power to places can be very expensive), the school owned the property, there were houses close to it (having houses close to valuables decreases the likelihood of vandalism or theft, because of this a guard house will be built no matter where the pump gets put), and very little work needed to be done in order to use the land. The problems with spot 1 were that it was somewhat close to the water but was about 280m away, most of the pipe running from the pump to the tank would not be on school property which would mean that the school would need to get permission to lay the pipe and anytime fixes needed to be made, and it was the farthest away from the school meaning more pipe would need to be used and more labor to lay the pipe. More pipe also meant more places where problems could occur.

The advantages to Spot 2 was that it was close to power, was around houses, was only 40m from the water, and nothing had to be done to the land in order to build on it. The disadvantages were that the school did not own the land (a friend of the school had offered to sell the land to the school), it was a very small piece of land and did not have room for a guard house, and just like spot 1 it was far

away from the school so the same approval that would be needed to run the pipe from spot 1 would be needed for spot 2.

The third option was Spot 3. The advantages of spot 3 were that the school owned the property, this property sat right on the water, the school owns almost all the land where the pipe from the pump to tank would be run or if they did not own it a friend of the school did, it was the closest to the school meaning less pipe would need to be bought and run, was directly in line with the school and most of the options of where to put the tank, and there was room for a guard house. The disadvantages were that it was far away from power and it lacked existing houses to provide additional security.

The final decision was made by the director, Hart, Lynn, and myself. Even though spot 3 was the most expensive this spot was selected. The advantages to spot 3 were that the school would need to get very little permission to run the pipes because it owned most of the land the pipes would be run on. This would eliminate problems when property was sold and if the villagers ever changed their mind. Spot 3 also had enough room to start building one guard house and possibly a second along with enough land that the school could start gardening on it. It also was the closest to the school which meant less pipe, less connections, and less possibility for errors from the workers. Skilled workers are hard to come by in the bush of Tanzania. So, the school has had to train most of its workers and even with training, Tanzanians don't understand why follow-through or quality is important, thus the less possibility for mistakes the better.

The next major decisions that had to be made were where to put the tank and what type(s) of pump(s) to use. Depending on where we put the tank would determine what type of pump the school would need. In order to have water pressure the water tank needed to either be elevated or be pressurized by a second pump. The picture below shows the four different options for where to place the tank.



Options 1 and 4 sit on a hill and would not need to be elevated further or to be pressurized by a second pump. Spot 2 and 3 sit relatively close to the school and on similar elevation which means they would either need to be elevated or pressurized with a second pump. Also the school currently did not own the land for spot 3. The local church owned the land and had told the school they could use it if they needed it. So, while the school would not need to pay for the land it would mean that the school would not own the land their water tank sat on. In the Tanzanian culture this could cause significant problems in the future, as promises made at one point often are not upheld at later times.

The method for pressuring a tank is by adding a second pump that would pump water out of the water tank. This option was quickly overruled because of the costs associated with having to buy a second pump, supplying the second pump with power, upkeep costs, additional protection cost to make sure that no one damaged the pump, and the cost of having to build a tank that could be pressurized.

With the option of pressurizing the tank eliminated, we soon eliminated the option of manually elevating a tank. This was concluded after looking at the cost of building a platform that would be at least 30ft tall, the increased engineering needed to construct the platform and tank in the air, and that some of the villagers the school wanted to help supply with water sat at a higher elevation than the tank would be raised to meaning those house still would not be able to get water.

With these two decisions made the options left were either spot 1 or 4. The final decision was made to use spot 1. This decision was made after looking at the path way the pipe would have to take to get up to the hill and back down. The path to spot 1 was straighter, weaved though fewer houses, and was perfectly in line with the current main water hook up for the school. Also, the village of Bulima, owns the hills and the director knew that the village leaders cared less about the smaller hill which is the hill spot 1 is on. The hill is not shorter than the big hill. It actually is almost as tall as the first hill it just has less area.

The next task was to find a spot to place the tank on the hill. All of the work in clearing the land, leveling it, and building the tank will be done by hand. So it was important to find a spot that was easy to get to and was relatively flat to begin with so that less work would need to be done in order to clear the land. Using a GPS borrowed from the local bible college. The director, Hart, Lynn, and I spent an afternoon surveying the hill and discussing possible places to put the tank. We came to an agreement to place the tank about $\frac{3}{4}$ of the way up the hill on a relatively flat spot. This spot was chosen because it

was easy to get to, would supply ample pressure because of the elevation, was in line with the current main water tap, and it could be easily leveled to put the tank on it.

The pump that was chosen a Grundfos CR 15. A local pump company presented three different pumps to me as possible options that could be used. The Grundfos was chosen based on advice from a pump engineer in the states. The elements considered were the head (the head is the elevation that pump can pump to) and the flow (the flow is how much water the pump can pump per hour). It was very important to choose a pump that would be able to meet future water needs of the school as it expands. This pump can pump in just under two hours enough water to supply the school with water all day based on the current water usage.

With these decisions made the director took all of the information gathered to the village leaders to get their permission to use the spot on the hill. The director advised me not to go with him as the village leaders did not speak English, still don't really like mzungus (white people) because they see white people as wanting to come and change their culture, and they know the director because of the work he does with the school. Also, bribes are still culturally acceptable and one of the main stereotypes of mzungus is that they have a lot of money. So, the director suspected the village leaders would be more likely to request a bribe if I went with. About two weeks later the director was called to the village leaders where they gave him the permission we needed to use the hill. The way it works is that the village still owns the land but essentially the school would own it because they will be using the land to better the community. Which means that village won't bother the school about the land as long as the land is being used to better the village.

The last major decision I helped with was deciding where to get the power from. Normally it would have been a simple decision, just bring it from the closest existing power pole. What made this more difficult was the fact that the closest power pole was right next to the lake about 600m away and

the power company told us that if we were to use that pole they would have to come inland some and then across to where we needed it. They did not want to run a series of poles right next to the water. The next factor was that the school is in the process of building a Form 5 and 6 building that would need power and also was not close to an existing power pole. Another factor was that the pump would require what was called phase 3 line and the form 5 and 6 building would only require a phase 1 line. A phase 3 line is about twice as expensive as a phase 3 line. Also, a phase 1 line can be run off of a phase 3 pole but a phase 3 line cannot be run off of a phase 1 line. After weighing these different factors and getting cost from the power company we opted to run a phase 3 line from the local dispensary (figure 1) to the pump and then run a phase 1 line from the phase 3 line to the school. This ended up being the most cost effective option to allow the school to run power to both the pump and the new form 5 and 6 building.

Along with those decisions multiple others had to be made as well. We needed to decide what diameter and gage of pipe to use, how to draw the water from the lake, what type of connections to use to connect the pipes, how to keep debris from getting into the system, and how to install air release valves into the system. All of these decisions had significant time and effort put into deciding what would be best for the school. The final decisions made were to use 100m rolls of 3in diameter gage C PVC pipe to go from the pump to the water tank, the water will be drawn from the lake into two “sumps” (basically storage tanks in the ground) by gravity, a basic pressure seal will be used to connect the pipes, a foot (a foot is a cap that can be put on the end of a pipe that has small holes in it) will be used to keep debris out of the system, and finally three air valves will be installed in the main line to release air press using a saddle (a saddle is a clamp put over a pipe that cuts a hole into the pipe that allow another pipe to be connected to it).

My day to day routine never looked exactly the same. Some days I would be walking around the school grounds surveying the land looking for ideal places to build. Other days I would be computing numbers to see how much material would be needed and what the costs would be. About once a week the director, myself, and any number of other staff from the school would make the two hour trip into Mwanza (Mwanza is the closest big city.) While in Mwanza our time would be spent talking to engineers, hardware suppliers, looking for skilled workers, and working on other business for the school.

All of the above decisions were made over a month and a half period. Most of the decisions were being worked on simultaneously as different piece of information became available. While making the decisions we consulted with two hardware supplier, three water system engineers, two local contractors, two pumps engineers in Tanzania and one in the United States, the engineer who designed the water system the school was currently using (the system is owned by a local bible college and cannot handle the increased capacity the Lion of Judah requires), and finally with my father who owned or worked in a lumber yard or hardware store for 20 years. Also, some internet research was done to help with calculations and design.

While doing the research for the project I had the opportunity to work with local engineers, hardware suppliers, and builders. This gave me an opportunity to explore the business practices of another culture like I could only have dreamed about. Most of the business owners spoke fluent English so I was able to communicate with them. The first time I meet a business owner the director of the school worked with us on the design and helped explained questions we had. However, after the initial interaction the director would leave me with the owner to discuss different ideas and solutions. This gave me an opportunity to see firsthand how businesses operated and forced me to adapt my approach to the business owner's style. Some examples of the different businesses practices are first that even in a hardware store the customer is waited on. I would walk in and tell the owner what I needed and he

would send someone to get all the parts. Another difference is that it is expected that as a customer you will negotiate the price of an item. It actually will be taken as an insult to the owner if a customer just accepts the first offer made. So, learning the art of negotiation and what items actually should cost was an interesting experience. These experiences along with many others gave me a glimpse into the business practices of a culture that had different values than my own.

During my time I helped manage/director/oversee the work being done on the water project as it got started. The portions I helped oversee were the clearing of the land by the lake that would be used to house the pump and guard house, the digging of the sumps, the making and instillation of the cement rings into the sumps, and the beginning portion of digging the foundation for the guard house along with building the foundation for the house. This experience was eye opening. It presented me with many challenges that I would need to think through and find ways to approach them unlike any way I had been taught to do or had tried before. Many aspects affected this.

The first was that very few of the workers that I was managing spoke English. This in its self created a tricky situation, how was I to manage people that did not understand a word that I said? It took me some time but I slowly learned to use pictures I could draw in the dirt along with using a tape measure to show them the length, depth, or heights to use. From here I also learned to use pieces of strings and cut them to the length needed for the project. For example if the sump needed to be 6m deep I would cut a piece of string 6m long and would use hand gestures to show them that the bottom of the string needed to be at the bottom of the hole and when stretched out, the top of the string should be at the top of the hole. This technique worked really well. Second, I was also able to pick up a small amount of their language. Mainly the words I learned revolved around work I was doing so over time this also made it easier for me to direct the workers.

Another challenge was the lack of trust towards me by the workers. There were many reasons for this ranging from the fact that I was young (it is rare for any one in their culture to be in my position until they are at least 30 or 35), I was white, and they had not worked with me before. To overcome this I did a couple of things. The first thing I did was to show them that I was willing to work myself. One of the quickest ways to gain respect in their culture as a leader is to show them that you are willing to do the work also. So, for a couple of days I took turns with the worker doing the manual labor and even after that if the project was behind or the workers were tired I would take a turn digging, moving rocks, or carrying buckets of water. Also, when decisions needed to be made I made sure that I was around and the workers heard me talking even if they didn't know what I was saying. This allowed them to realize that the director respected my opinion which in turn meant they should also. The final thing I did was show them that even though I could not speak their language I wanted to work with them. I did this by trying everything I could to get my point across. This was demonstrated on many occasions when it became obvious to me that the workers did not understand what I was saying and I just kept trying different ways to communicate my point until they understood.

By far the best learning experience I had was learning to work with people that were completely different from me and with whom I could not commune. I have heard through all of my management classes that I will have to work with people that are different from me, that have different viewpoints, backgrounds, and different methods or work ethics. While I knew this was going to be true, I don't think I could get such a different group of people from myself to work with. Everything from their culture, their lifestyle, their background, how they see the world, how they saw me, and how they approach life was completely different from me. This put me way outside of my comfort zone but I realized that I needed to learn how to handle myself in this situation if I ever thought I would be able to handle managing a team in the United States. As I explained above I slowly learned how to manage the team I was working with. During the experience I was challenged to work outside of the box, to try things that

are way outside of my comfort zone, but to realize that it was a chance for me to learn about how to lead in an environment that I was not used to. It also made me realize that the best way to do things is not always the standard way or the way everyone uses. That sometimes the best way to do something is by thinking of what really is the best or most effective way to do it not what is the standardized way.

I don't know if there is a good way to sum up an experience like I had and everything that I learned. This paper only talks about my work with the water project. While I was at the school I helped on many other projects. Those experience combined with my work on the water project stretched me and forced me to apply the things I had been learning in school while also needing to learn new things while working.

The goal of my thesis was to help design and manage the construction of a new water system for The Lion of Judah Academy and to apply the skills and techniques I had been learning in school about project management and leadership. Looking back at my time I would say that my Thesis was a success. While the water project was not yet finished when I left, it had been completely designed and the work had been started and was well underway. Further, the plans had been laid for most of the rest of the work that needed to be done. I was given the opportunity to work in a different culture than mine forcing me to think of new and creative ways to approach how I managed my team. This experience had allowed me to see that there is a need for people to use their talents to help others in need whether it is people just a block from them, or people that live half-way around the world. I have walked away from this experience a changed person and know that this experience will go with me the rest of my life.

Appendix

Figure 1

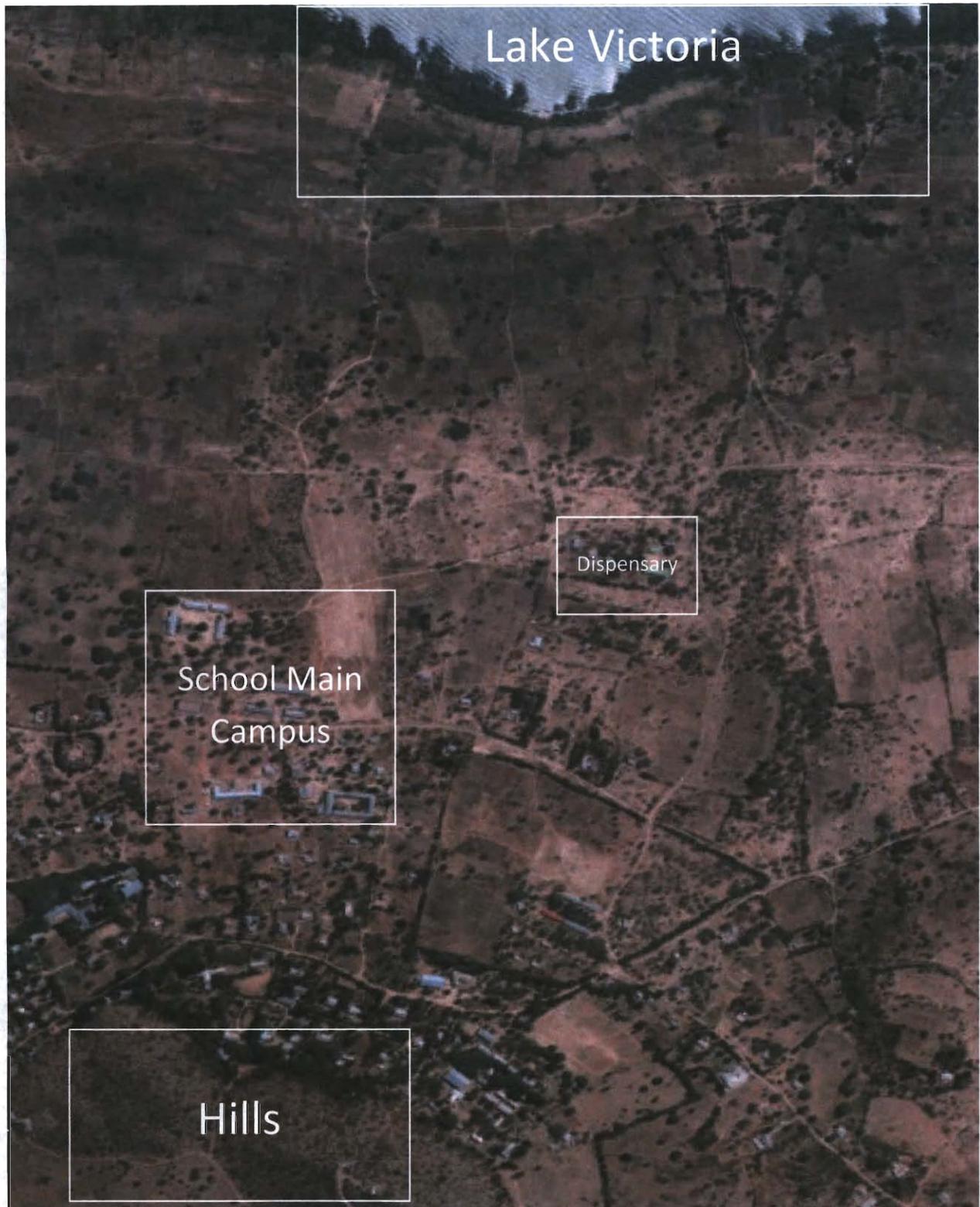


Figure 2

