Service Learning in Belize: Christ the King Water Fountain

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Christ the King

- Christ the King Primary School is situated on the coast of Dangriga, Belize, next to the Caribbean Sea. Dangriga is the largest urban area in southern Belize and is the capital of Stann Creek District.
- About 210 students attend school at Christ the King in Infant one and two and Standards one through six, corresponding to grades one through eight in the United States.

The Old Fountains

- The school had previously installed two water fountains located outside the bathrooms in an area of the campus that could not be seen from any classrooms or the principal's office. The pipes running underground were considered to be too close to the septic system. School staff and parents considered it unsafe and unsanitary, two aspects that violated the fountain's social sustainability.
- The fountain was vandalized on a regular basis and unauthorized use became a problem. Christ the King is not located in a residential area and is adjacent to a basketball court that is frequented in the evenings. Because there was no protective structure built to enclose the fountains, they were unsustainable in the built system.

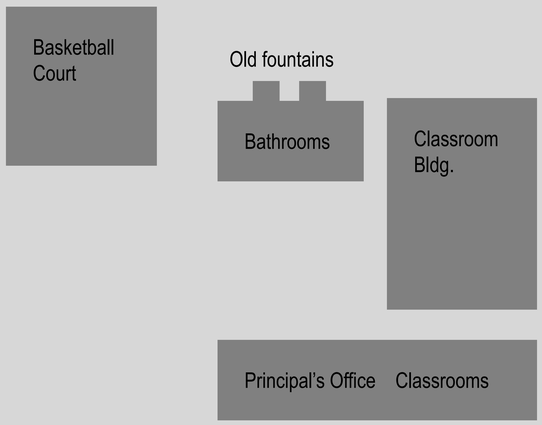


Diagram of old fountains with respect to campus and basketball court

- The school would have to pay to repair the damages regularly and for unauthorized use of the water. For these reasons, the fountain was not economically sustainable, violating the managed system.
- The fountains were used for only two months. When the group arrived, they were no longer functioning.
- In the time between use of the old fountains and the completion of the new fountain, students brought cups to school and accessed the only sink in the small kitchen for water. Children would make messes in the kitchen because they were unsupervised. This was an inconvenience to ladies working in the kitchen. This method proved to be unsustainable in the social system because it was disruptive and students were discouraged from filling their cups more than once a day. It was unsustainable in the managed system because the children were unsupervised.

The New Fountain

- A group of six students, representing industrial, civil and mechanical engineering disciplines, built a new fountain in two days.
- The decided location was visible from most classrooms and the principal's office. After the length for pipe was measured and the least amount of pipe elbows needed was determined, the protective structure was designed.
- It was decided that a wood box would be constructed flush with the side of the building to enclose the fountain. The length and width of the box would be two feet, while the height would be three feet, allowing for a vertical staff that would be two feet tall, so that a bucket could be filled. The front of the box would open like a door and be locked in the evenings.
- A teacher at Ecumenical High School donated most of the tools and Peacework donated wood. Twenty-seven two-feet planks and four four-feet posts were cut from the wood.
- Fifty feet of three-fourths inch PVC pipe was purchased at $1 BZ per foot. Four hinges, sixty-eight screws, a bottle of glue, a pipe cutter, connectors, two valves, a spout and a lock were purchased at a total of $40 BZ, totaling $90 BZ for the entire project.
- A trench was dug alongside the building and around two corners from the water line connection to the fountain. The pipe was connected and glued in the trench. Pressure was tested after the glue dried, and the trench was then filled.
- For the box, the four posts were placed in four holes that had been dug with a posthole digger and the top and sides were constructed. The door was constructed and attached last.


Old fountains outside bathrooms


Civil engineering student, Chase Henrichs, filling the first jug of water


Megan Peters, putting together the door to the box with help of a student


Pumping station at Dangriga's water facility in North Stann Creek

Results

- The project was implemented in a manner that solved the school's financial boundary. It addresses all of the problems with the old fountains and kitchen use.
- The principal expects the new fountain to last up to three years. She held a fountain dedication for the school.


A group of engineering students at the school's dedication of the fountain


Christ the King Campus, taken from the center of the outdoor courtyard, showing the fountain

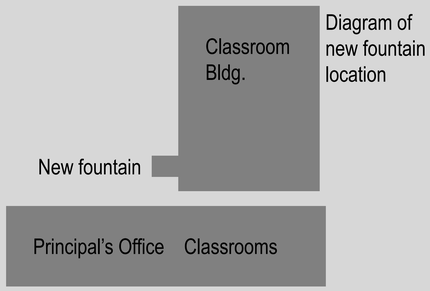


Diagram of new fountain location

Sustainability

Built Sustainability

- The built system of sustainability includes the design and construction of structures in a manner that poses little impact on the environment and takes into account location and surroundings.
- The fountain was built with minimal material waste. The donated wood was left over from another project. Only the necessary amount of pipe materials and screws were purchased. The tools were loaned to the group so they would not need to be purchased.
- The protective wood box enclosing the fountain will discourage vandalism, and the lock on the door will prevent unauthorized use. It will also protect the fountain from children playing around it and severe weather, which could cause damage.
- The trench was dug eighteen inches in the ground so that rain, severe weather and children playing could not damage the pipe.
- The pipe stands two feet tall so that a bucket could be filled for a classroom. This way, children will not have to continually disrupt class to fill their cups and may drink more water.
- The fountain is not in an inconvenient location for anyone and is not near anything that could cause harm to the water quality.

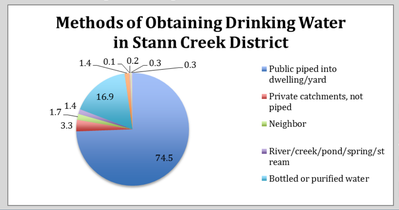
Sustainability

Managed Sustainability

- The managed system of sustainability considers economic and legal constraints to maximize return on projects.
- Vandalism and water theft should no longer be a problem for the fountain. These activities are illegal in Dangriga, but remain an issue.
- The project was constructed under a narrow budget. It was less expensive for the group to execute the project than it would have been for the school because labor was free to them and the wood and tools were donated.
- The school will only pay for the water being used during school hours and repair costs will be negligible.
- Materials were purchased locally, which supported Dangriga's local economic activity.

Social Sustainability

- The social system of sustainability focuses on people.
- The new fountain will be students' only source of hydration during school hours, an alternative to sugary juices.
- Students who attend Christ the King, but live outside of Dangriga in rural areas, may not have access to clean water all year. Most people living in Dangriga have piped water to their homes; however, those living in the surrounding villages may have other methods of obtaining drinking water.



Data obtained from 2010 Belize Population and Housing Census

Reflections/Future Work

- The project provided first-hand experience in using knowledge and skills learned in the classroom to implement a sustainable small-scale project in a developing country in another region of the world. The sustainability of projects such as this one is very important to end-users, in this case, Christ the King.
- An interdisciplinary team of engineers worked together in the design and construction of the fountain.
- Communication with local partners was vital in understanding their needs and addressing those needs with the project.
- This project began interest in water situations in developing countries, which has further developed into research in water management and efficiency.

Acknowledgements

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