

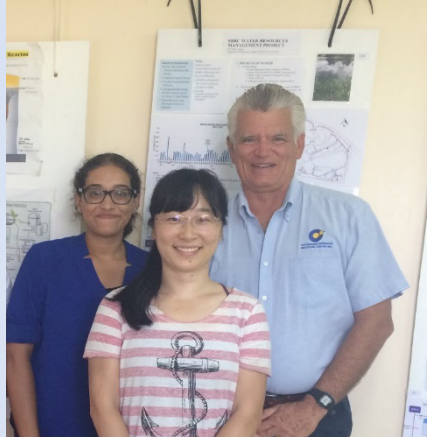
Identifying the Water Usage at the Sustainable Barbados Recycling Centre and Efficient Water Resources Management Strategies

Internship Report at Sustainable Barbados Recycling Center Inc. (SBRC), Barbados

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Barbados is one of the top water-scarce countries in the world. As an island country in the Caribbean region, Barbados' only freshwater source is rainwater and groundwater. Most of the rainwater is lost through runoff and infiltration since the island's main geological composition is karst limestone. Although some efforts have been completed by the government to apply more water conservation strategies, there remains a need to further elaborate and improve current

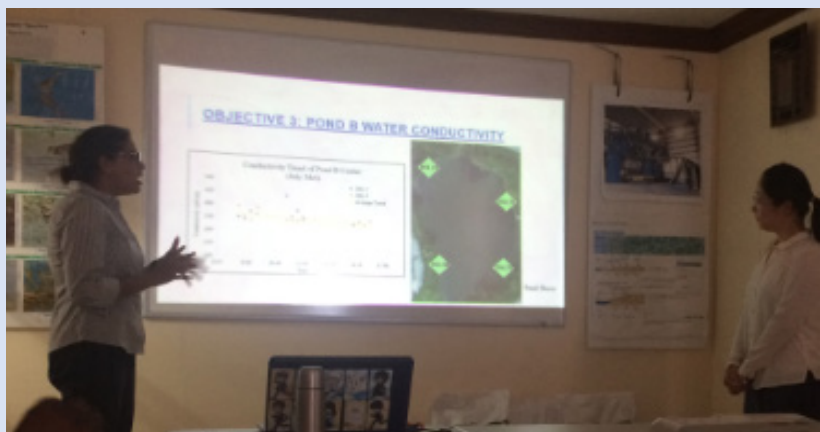


With an area over 35 acres, the Sustainable Barbados Recycling Center Inc. (SBRC) is located in Vaucluse in the parish of St. Thomas, Barbados. SBRC's main goal is to handle the waste coming from the island's residents and minimizing the volume of waste being diverted to the landfill. This would diminish any adverse environmental impacts from the waste.

During this 13-week project, the current water resources management at SBRC was investigated, which enabled for recommendations to be given for future improvement on water conservation. The results reveal that SBRC uses a significant amount of potable water within the unmonitored regions. Out of the three locations on weekdays, the Operations Building uses the most potable water ($1.15 \text{ m}^3/\text{day}$), followed by the Workshop ($0.48 \text{ m}^3/\text{day}$) and the Administrative Building ($0.27 \text{ m}^3/\text{day}$). The unmeasured value, shows that $1.82 \text{ m}^3/\text{day}$ is used around the rest of SBRC. Weekend potable water usage is $19 \text{ m}^3/2\text{day}$ which is unusual.



The rainwater was tested for pH and total coliform in order to estimate its quality and whether it is safe to use. The rainwater collected around SBRC show an average alkaline pH above 7.6 in all 4 locations. The collected rainwater from the rain gauge has a very low coliform count ($<1 \text{ CFU}/100 \text{ ml}$) and the number of coliform in the irrigation pipe is much higher ($4.7 \times 10^4 \text{ CFU}/100 \text{ ml}$). The potential of having one more harvesting tank for rainwater collection in the facility have been evaluated for feasibility. One more harvesting tank at Transfer Station can harvest extra $1,057.60 \text{ m}^3$ of rainfall per year. The cost of the new fiberglass tank can be paid back in 5.2 years.



The stormwater retention pond which is a low-disturbed ecosystem is important to the species of Tilapia fish and the numerous bird species in the region. The pond was quantified and tested with quality parameters including pH, conductivity, salinity, total dissolved solids, dissolved oxygen and total coliform. Measurement of pond depth was taken on June 21-23 and the water surface area in Pond B was calculated as 4012 m^2 and the storage volume as 8797 m^3 . On average, the water level was found to be 197.3 m above sea level. Based on the mass transfer equation, the average evaporation rate was calculated to be $20.78 \text{ mm}/\text{day}$. Daily water loss volume was $83.35 \text{ m}^3/\text{day}$ which was close to the pole reading on sunny days ($2 \text{ cm}/\text{day}$), meaning that the calculated evaporation rate is accurate. Comparing with water samples taken around Barbados, most parameters

show results that the pond water has no significant adverse impacts on human and the ecosystem except the high pH level.



Six recommendations are given to improve water management at SBRC according to the study results. Recommendations include adding another rainwater harvesting tank, encouraging more rainwater usage, controlling potable usage, replacing toilet water with rainwater, installing a rainwater treatment system, and incorporating wastewater recycling system when washing equipment and vehicles. Future research needs to be conducted on runoff quantity and quality, and a metal testing analysis should be completed on the rainwater and the pond water.



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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors. For more detailed information, please contact SBRC or the authors of this report.