

Sociotechnical Synthesis

Something that all people need to support life is clean, freshwater. For my research projects, I explored the various limits on water use, and also how water is managed in different places globally. Notably, there are many environmental constraints that are aimed at preserving the local water quality. My technical capstone design project was aimed at the restriction of gasoline propellers in protected waters. In this project, my team and I needed to develop an electrically-powered propulsion system for a personal watercraft that can be used in very shallow waters. Through this design project, I began to explore the fundamentals of water system governance and how it varies geographically. Especially in developing nations, access to water had been commoditized in an ineffective way to encourage economic development. I explored the flaws of decentralized water to advocate for a better solution. Both of these projects work simultaneously to better understand the ways in which fresh water works in society.

For my design capstone, my team and I had to develop a solution to both a gasoline and a water-depth restriction. To do so, my team and I decided to go along the lines of a battery-powered, water jet propulsion system. Unlike a traditional propeller system, water jets draft a few inches rather than feet, so they can be used where water is very shallow. Through the use of additive manufacturing, we made two water jet housing systems that were mounted onto a fiberglass personal watercraft. In addition, we developed code for a microcontroller system to have steering and power governed a fly-by-wire system. After rigorous testing and development, we were able to effectively have a powered watercraft in waters with tight environmental restrictions.

The development of a watercraft around local water laws is one exposition of how water is managed. Another revolves around the fundamentals of municipal drinking water.

Many nations have struggled to find an equitable way to characterize service, and this is extremely evident in Latin America. In the late 1990's, the World Bank made water devolution to a private holding group a stipulation of loans to developing countries; the free market would hypothetically bring more wealth to these nations. This measure was not effective as the private holding companies were allowed to charge very high rates and given a monopoly over municipal water. The water became commoditized, and the question in these places became "who can afford water?" My research paper focuses on the flaws, and strives towards a more equitable solution holding water access as a human right.

Both of these projects yielded very interesting results and a broadened understanding of the nuances of the modern world. Overall, both projects were successes. I would like to thank my family and friends. I would also like to thank Professors Kent Wayland and Sean Ferguson for their guidance on the STS research paper. I also want to thank Professor Gavin Garner for his enormous contribution on my capstone project and helping us arrive at a successful conclusion.