

Problem

The importance of clean water can not be understated. The lack of adequate water services is a cause of much illness in developing countries. The World Health Organization estimates 900 million people each year suffer from diarrheal illnesses or other diseases that spread through contaminated water. In developing countries, roughly 80% of illnesses are linked to poor water and sanitation conditions (The Water Project). This also contributes to deaths via diarrhea, which totals to be 2.2 million globally per year (World Health Organization).

Importance

It is hard to fathom the importance of having clean water. Many illnesses in developing countries can be linked with the relation of contaminated water. Some of these diseases being malaria, which kills thousands of millions per year; the same is true with worm infections that inhabit dirty water. Outside of direct illness, not having access to clean water makes it harder to bathe and cook without several concerns. Overall, not having clean water provides many disadvantages across the board, some being minor and others being fatal.

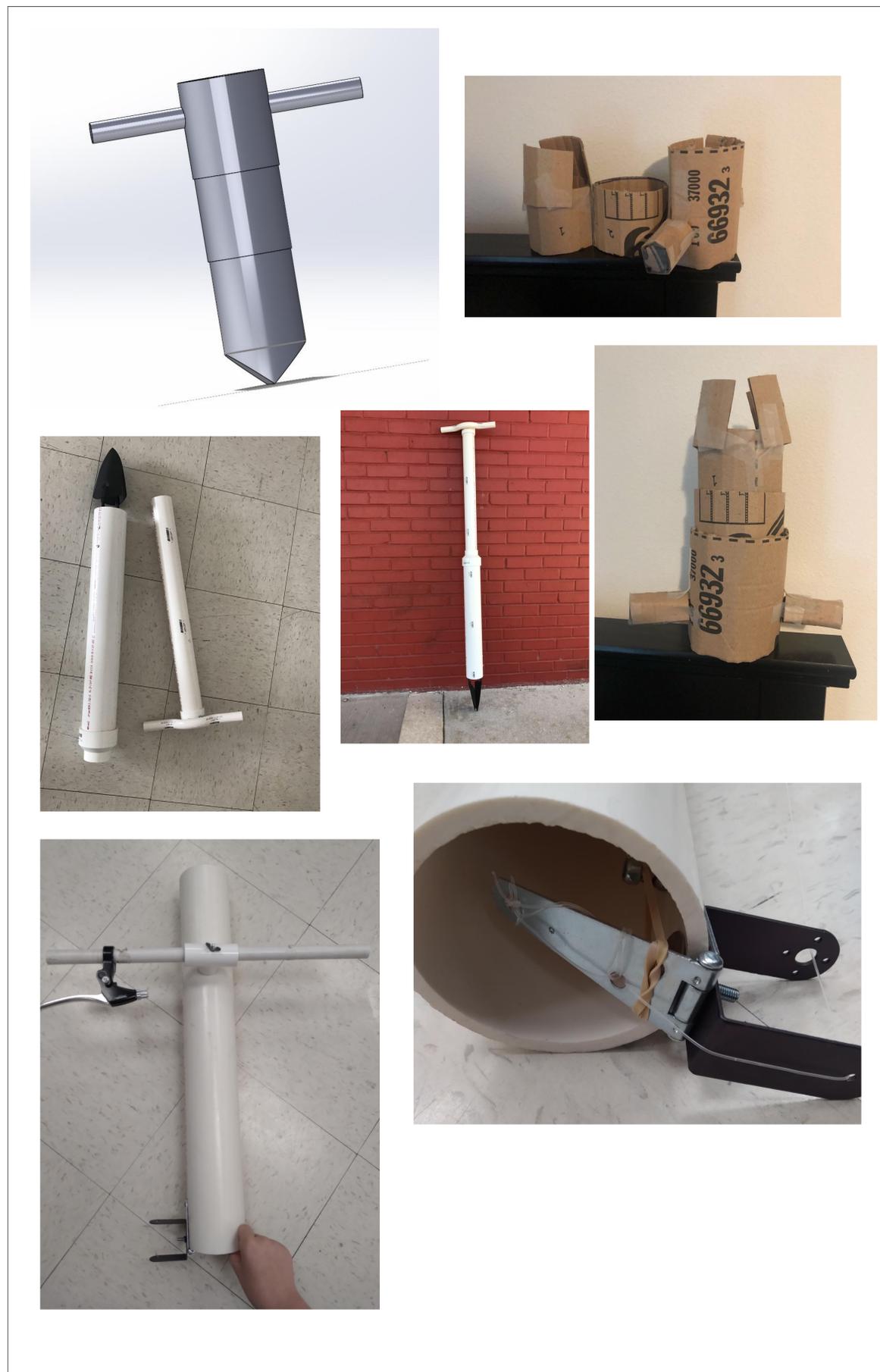
Chosen Solution

The solution our team chose can be referred to as a manual planter for palm fronds. This solution has a primary goal to protect sea grass that survives in the underwater regions. Seagrass serves as shelter and food to a stream of animals as well as being a natural filter for water. Utilizing seagrass to filter water, will provide multiple benefits to the environment. Our design is a passive solution that overall prioritizes the environment quality while providing clean water for utilization.

The solution resembles an old-style seed planter. The solution works by a lever system, when the handlebars are pulled, the bottom attachments open. The idea is that by pulling back on both parts it will open the "mouth" of the design as well as close it when you release the handles. These attachments would be used to insert into the substrate to remove dirt, then closed, then opened to deposit dirt in a separate location. This creates a ditch for palm frond to be inserted in with ease. Further, the solution is wide enough for the palm frond protectant to be inserted in. With the palm frond inserted in the solution and the levers are pulled once again, the solution becomes a chute for palm frond to be inserted into the sediment. The solution utilizes a bike brake lined with fishing line, pulled through a C bracket and then weaved through a hinge. When the brake is pulled the hinge opens, and when released the hinge gets pulled back to resting position by rubber bands.

Furthermore, the solution can be broken down into two main parts. Having this ability makes it far easier to transport the solution from one area to the next. Further, the solution utilizes a strap that goes across the body in order to transport long distances.

Prototype Development



Summary of Findings

The specific features that we tested include, the shovel/opening attachments in a resting and open position and the overall smoothness of the mechanics. The testing environment consisted of using the solution in a marine environment; testing in silty substrate, and in thicker (mud consistency) substrate. After testing it was concluded that the hinge digger style worked best in the wettest sand, the sand that is in a near constant submergent of water. But the mid-grade sand, was the easiest to transport. Observations, accounting for outside research, and testing can only show so much of the real world application when it comes to multiple-step, large scale solutions like this. The solution would be effective in planting palm fronds in order to protect seagrass plants. This can be devised from not only the testing, multiple prototypes, but also the simplicity of the design. Having simple mechanics combined with a thought through design makes an effective solution. The tests developed provide data, that in a developing country, the solution would be able to plant palm fronds. These tests can prove the solution is plausible because they recreate the intended environment. The tests put the solution to the test of multiple environments. Whether the developing countries' water source has a silty/sandy bottom or a thicker mud bottom, the tests show what the solution excelled in. Due to time constraints a final model was not completed. Without a final model, it can not be said what modifications need to be further made. But it can be derived from the thought through tests and concise design, that in its final form, the manual palm frond planter would effectively plant palm fronds. These palm fronds would protect seagrass, so that they in-time filter the developing countries' water source. The developing countries citizens would then have filtered water, to cook and clean with.

Resources

""Water Pollution Worries in Developing World." *EcoMENA*, 12 July 2020, www.ecomena.org/water-pollution/.

"Drinking-Water." *World Health Organization*, World Health Organization, www.who.int/news-room/fact-sheets/detail/drinking-water.

Gavin, Kendall. pp. 2–19, *The Development and Testing of a Biodegradable Seagrass Growth Box*.

Gavin, Kendall. pp. 2–9, *The Development and Testing of a Biodegradable Seagrass Growth Box (Year Two)*.

Media, Site by Reshift. "Metals That Don't Rust." *Metal Supermarkets - Steel, Aluminum, Stainless, Hot-Rolled, Cold-Rolled, Alloy, Carbon, Galvanized, Brass, Bronze, Copper*, 29 May 2018, www.metalsupermarkets.com/metals-that-dont-rust/.

"Water." *United Nations*, United Nations, www.un.org/en/sections/issues-depth/water/.

"The Water Crisis: The Importance of Clean Water to Health." *The Water Project*, thewaterproject.org/why-water/health.

Canada, Global Affairs. "Water in Developing Countries." GAC, 26 July 2017, www.international.gc.ca/world-monde/issues_development-enjeux_developpement/envir/mental_protection-protection_environment/water-eau.aspx?lang=eng.

"Why Filter Water." *Waters Co Australia*, www.waterscoaustralia.com.au/pages/why-filter-water#:~:text=Drinking clean, filtered water protects,overall greater health and energy.&text=Water filters reduce the risk,is especially important for children.

jphe.amegroups.com/article/view/4741/5523.