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DEID Honduras Grey Water Treatment System & Efficient Cookstove Project

This summer, with the help of funding from the DUCIGS Summer Research Award Grant, I was able to travel with four other undergraduate students to the rural community of El Pital, Honduras for one month to implement two separate pilot/research projects: upgrading an existing grey water treatment system with new grease traps, and constructing a new type of cookstove in a home in the community. The goal of these two projects was to construct one grease trap and one cookstove, and then to evaluate their performance and see if they do in fact help to solve problems facing the community. The two problems we were attempting to solve with our designs were: that the current grey water system had ceased to function, and respiratory problems caused by smoke being vented into homes from cookstoves. Both projects were successful, and we ended up constructing a second grease trap to allow our successful design solution to aid more members of the community. Besides successfully functioning and solving the two problems we set out to solve, we learned a lot of new information which changed several preconceived notions of what was causing these problems.

The grey water treatment system in place before this summer had been built by our organization, DEID (Duke Engineers for International Development), in the summers of 2015 and 2016. The grey water system consisted of a piping network which connected houses in the community to large treatment beds where it passed through sand and gravel in order to be filtered so that it entered the environment as clean water. Before the grey water entered the treatment beds, grease was removed by grease traps which were large barrels that the grey water entered so that the grease floated to the top and could be removed. However, within a month of implementation both years, the system had ceased to function. This was attributed to a build up of grease in the treatment beds, which effectively clogged the entire system. We attributed this to incredibly (and seemingly inexplicably) large amounts of grease entering the system. Thus, our design was a very large “industrial” grease trap that would hold several times the amount of water and grease that the existing barrels had. It also had an extra dividing wall between the inlet and outlet in order to further encourage the grease to separate and float to the top. Our plan was to build one of these large grease traps, clean out the clogged treatment bed, and reconnect it to the system. We would then see if this design was effective and prevented the system from clogging. After arriving, we dug up the piping through which the grey water entered the treatment bed. In this piping we made a shocking discovery: the pipes were completely clogged with a black sludge. It was then that we realized the real problem: it was not grease that was entering the treatment beds and clogging the system, but food matter and hair. It was an “a-ha” moment, and we redesigned the grease trap to include two mesh filters in order to catch this matter and prevent it from entering the treatment beds. After constructing the first grease trap with the filters and connecting it to the system, our hypothesis was confirmed when we saw a black sludge accumulate on the filters. This grease trap ran for a full week without problems before we constructed a second (there are a total of four treatment beds and separate pipelines which make up the system). This, too, functioned just as expected, and there was also the tell-tale accumulation of black sludge on the filters. Overall, we made an important discovery that

challenged what we thought about grey water treatment systems, and will hopefully lead to more successful implementations of similar projects in the future.

In the community of El Pital, many families cook with wood-burning cookstoves, which are often mud and brick structures with space below metal cooking surfaces for wood. The problem with these cookstoves is that they vent smoke into the homes, which causes respiratory problems amongst the members of the household, especially women who are often cooking for much of the day. Inspired by a previous DEID cookstove project in Costa Rica, we set out to construct a new cookstove design which would vent smoke out of a chimney and also be more efficient - the less wood that needs to be burned to be cooked also means there is less smoke. After choosing a home, we constructed a cookstove whose design was tailored to both the desires of the family and to the available materials in the community. After running the cookstove for nearly a week, the family reported nearly no smoke being vented into the home (in this case an outside area right next to their home), and will be reporting back to us soon whether they have found that they burn less wood to cook with. Overall the design was a success, and knowing that it works, we are now writing up an instructional guide in Spanish so that other members of the community can build these efficient cookstoves in their homes.

Overall our research project in El Pital, Honduras was a resounding success. We implemented two grease traps and one cookstove, both designs are functioning well (having solved the problems of previous/existing designs), and we learned a great deal about the problems that both the community and previous DEID projects have faced when implementing the grey water treatment system/grease traps. Thanks to the generosity of the DUCIGS Summer Research Award Grant, the information garnered from the implementation of this project will help future cookstove and grey water projects built by DEID and others in the future.