KlarAqua: A Catalyst for Sustainable Health and Economic Development

Illinois Institute of Technology

The World Health Organization estimates that at any given moment, approximately one half of the population of the developing world is suffering from one or more of six primary diseases caused by poor water supply and sanitation. This project seeks to find an acceptable solution that is economically and socially practical. Many techniques have been utilized to purify water such as chlorination, distillation, boiling, sedimentation, and use of high tech filters. However, there are barriers associated with using these units effectively in rural areas. These barriers include, but are not limited to, dependence on chemicals, materials, electricity, maintenance, and high cost. Our team of students at Illinois Institute of Technology proposes a low-cost ceramic water filter as a means of removing turbidity and eliminating bacteria and other pollutants with improved efficiency, decreased energy and less equipment necessary than any current portable water purification systems. In addition to its sustainability, it is environmentally friendly, can be produced, implemented and maintained easily. The system effectively eliminates bacteria, removes turbidity and has the potential to eliminate other common surface and groundwater pollutants such as hardness, nitrate residues from fertilizers and arsenic. Its innovative three tier structure enables the simultaneous elimination of multiple contaminants. The system requires no extra equipment to store purified water and can be designed considering social and cultural factors of targeted communities.

The design team, in collaboration with a team of students at Monterrey Tec. Chemical Engineering Department in Monterrey Mexico, carefully analyzed a similar product created by Potters For Peace. In conjunction with the testing team, they used their analysis of this existing product to determine an ideal filter for removal of multiple pollutants from water while optimizing flow rate. This team has designed a product (KlarAqua) which can be made entirely by the local population using local materials, without complicated industrial technology, and with a useful lifespan. A derivation of common plastic containers which are currently used for water carrying and storage is a key element of the final design. Placed within the plastic buckets are three tiered filters which empty into a sanitary basin. A spout in the bucket allows for easy access to clean water.

The team has also investigated the intricate properties that colloidal silver reactions undergo in relation to bacterial contaminants, the correct ratio of clay and saw dust and the shape of the filter. Testing has been performed in all three aspects to evaluate the most cost-effective filter composition, weighing effectiveness of filtration and flow rate against the cost of colloidal silver and the ratio of clay to sawdust. Our recent visit to the villages around Monterrey confirmed material availability and collaboration potential with local artisans.

The business team has also formed a partnership with Monterrey Tec. in Mexico for local product testing, market analysis and design support. An initial effort in identifying important factors affecting implementation in three communities near Monterrey was carried out recently by five members of our team in October 2006. This pilot study was supervised by project faculty at IIT and Monterrey and analyzed current states of water purification systems in the communities, material availability, water safety knowledge level of locals and the demand for the KlarAqua water purification system.

KlarAqua is not just a product; it is a service to the community. Through partnerships with Universities, KlarAqua will couple its purification technology with an educational program. The business plan encourages economic development in KlarAqua's target markets. We believe that a sustainable program is one which provides a benefit or service to a group of people while stimulating economic expansion without creating a dependency on an external source.

The overall success of the product will be judged by the extent to which communities embrace this product and more specifically, the number of households with filters. The monitoring and evaluation of local system use will be completed through our partnership with Monterrey Tec, and eventually other universities near other target markets. Ultimately, the prevalence and extent of use will reflect our product's cultural relevancy, our educational and training programs, and the cost-effectiveness of the product.

This project is advised by Nasrin Khalili; the students in charge of KlarAqua's development are Laura Grimmer, Amanda Gilliam, Katherine Hadou, Samantha Staley, Brandon Lloyd, Petre Ikonomov, She Lemley and Snehalata Topgi.