The Development of 3R Water Filter: Round Wave - Rusty Wire - for Rural Regions

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Water pollution caused by Arsenic has become a major problem around the world, and more particularly in SE Asia. In this project I proposed a special type of a filter to address the aforementioned problem. Before developing the filter I had consider the wealth of most SE Asians and their culture. As of 2012, according to the World Bank report, more than 140 million people lived in extreme poverty in SE Asia. I was inspired by ceramic filters mainly used in rural areas. They are made by combining rice bran and soil. This filter can do basic filtering and it is relatively cheap. However, it has some drawbacks in terms of durability which is low, it has a low flow rate (~1.5L/h), and it cannot properly treat water containing Arsenic. I used this filter's basic principle. I designed several types of 3R water filter by using a 3d printer. I then chose two designs among them and made a prototype of each of them in the pottery factory. One of the designs is made by using spinning wheel method. This design is easy to make, cheaper, and more stable compared to the other one. I did some experiments to find how many round waves are better for the filter. I found 3 round waves to be more effective in terms of turbidity, the removal of organic matters, and the flow rate. Moreover, the typical Arsenic absorbent is iron oxide but it is so expensive so I decided to instead use rusty wire which can easily be accessed. I performed experiments and 2 rusty wire plates were very effective in treating water containing Arsenic To sum up, from these results I strongly believe 3 round wave filters with 2 rusty wire plates can be used to treat water containing Arsenic in developing nations, especially in SE Asia and I hope their usage can contribute to the world's public health.

Awards Won:
Fourth Award of $500