CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Isabella U. Hurvitz

Project Number
35140

Project Title
What Does It Take to Make Clean Water in a Contaminated World?

Abstract

Objectives/Goals
The objective of the project was to determine which inexpensive water treatment method was most efficient by looking at its ability to reduce water turbidity and bacteria. The project compared the methods with the purpose of finding a treatment that filters water effectively and is also well suited for the economic capabilities of the people in developing countries.

Methods/Materials
The treatment methods that I tested were: the LifeStraw media filtering straw, the Sawyer MINI media membrane device, Potable Aqua Iodine Tablets, the Steripen Emergency UV Purifier, and boiling. Water from Lake Los Carneros was treated using each method and compared to samples of untreated lake water and Kirkland Drinking Water. The turbidity of all collected samples was measured using a Hach 2100AN Turbidimeter. Then, bacterial colonies were grown on agar plates with swabs of each sample and counted after 24 hours. The efficiency of the methods was judged by the change in turbidity and the amount of bacteria colonies grown due to treatment.

Results
The Sawyer MINI is the overall most effective treatment with a 99.62% average difference, while all of the other treatments did not achieve an average difference greater than 60%. Individually, however, the device that was able to reduce bacteria most efficiently was the Sawyer MINI which had a 99.65% difference after treatment and the device that had the best results with reducing turbidity was the LifeStraw media filter straw which had a 99.87% difference after treatment. None of the treatments were able to reduce the quality of the lake water to that of the Kirkland Water which had a 99.99% average difference.

Conclusions/Discussion
The initial question of the experiment asked which kind of inexpensive water treatment method is most efficient at reducing water turbidity and total bacteria. The results determined that the Sawyer MINI filtering device was the overall most efficient treatment. The second part of the question asked how method and design affect treatment efficiency. This is answered by looking at the design and method of the Sawyer MINI treatment which is a media filter that uses a hollow fiber membrane. A real-world application for the results of the experiment would be to provide Sawyer MINI devices to people in developing countries and if the research continued, a better option could be found with the potential to benefit many lives.

Summary Statement
The project compared the efficiency of different inexpensive water treatment methods by judging the treatments' effects of reducing the turbidity and bacteria of lake water.

Help Received
Samantha Nguyen- UCSB grad student answered questions about microorganisms and culturing bacteria; Dr. Mark Morey provided access to the 2100AN Turbidimeter; Chemist Juliet Znovena reviewed report for appropriate scientific technique