



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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Project Title Terminating Turbidity: Using a Turbidimeter and Flocculant to Reduce Suspended Solids in Local Water to Drinkable Levels	
<p style="text-align: center;">Abstract</p> <p>Objectives The goal of this experiment was to reduce the concentration of total suspended solids (from pollutants and organic sources) in local lake, river, creek, and reservoir waters to drinkable levels.</p> <p>Methods A homemade turbidimeter was constructed using a circuit board, led light, photoresistor, power source, and multimeter to measure the turbidity from total suspended solids (TSS) in local bodies of water. The turbidimeter was calibrated by measuring standard solutions of known concentrations of finely ground soil and water; a calibration curve was created from the standard solution data correlating resistance readings from the turbidimeter's multimeter with concentration of TSS. The turbidimeter was then used to measure the concentrations of TSS in water samples collected from rivers, lakes, creeks, and reservoirs within a 30-mile radius in Riverside County. To attempt to remove the TSS, a 10% alum/water flocculant solution was created and added, 1 ml at a time, to the local water samples. The turbidimeter was used to monitor and measure changes in the concentrations of TSS in the local water samples as the Alum flocculant solution was added. Drinkability was measured in comparison to resistance readings from local tap water and distilled bottled waters.</p> <p>Results The concentrations of total suspended solids (TSS) in half of the samples were able to be reduced to drinkable levels using the homemade turbidimeter and flocculant solution. Concentrations of TSS in samples that were collected from running water sources (creeks and rivers) were successfully reduced to drinkable levels comparable to tap water and bottled distilled water. Concentrations of TSS in waters that were collected from standing water sources (reservoirs and lakes) were not able to be reduced to drinkable levels.</p> <p>Conclusions The turbidimeter and flocculant solution created in this experiment were successful in measuring and reducing the amount of total suspended solids in local creek and river waters to drinkable levels. The turbidimeter and flocculant created in this experiment would be simple additions to household emergency kits and could be used to effectively remove suspended solids from waters in local sources. Concentrations of suspended solids in local standing water sources were not able to be reduced to drinkable levels with the methods in this experiment and would therefore not be drinkable sources of water in an emergency.</p>	
Summary Statement I created a turbidimeter and flocculant solution and used these to successfully measure and reduce the concentration of total suspended solids to drinkable levels in local running water sources.	
Help Received I designed and built the turbidimeter myself. I researched about flocculants in pools and as treatments for super blooms and made my flocculant myself. My mom helped me to understand the math behind the calibration curve that I made using Excel. My Dad drove me to the local water sources.	