Shocking! A Study of Electrocoagulation in Treatment of River Water

Guerrero, Garrett

Trees, Matthew

“Clean, accessible water for all” is one of the seventeen sustainable development goals set by the United Nations. Electrocoagulation, which uses electricity to remove contaminants, can help meet this goal for people around the world. Although electrocoagulation has been used for many years, the Elequa system uses open-source software, designs for 3-D printed parts, and an Arduino processor. This system is more affordable for individuals and developing nations, and encourages collaboration in research and development. Our project tested two hypotheses: 1) that an Elequa electrocoagulation system would improve measures of Total Dissolved Solids(TDS), coliform, and Escherichia coli bacteria when compared to a control; and 2) that improvement would be related to the type of electrodes used—4-aluminum(4Al), 4-iron(4Fe), and a 2-aluminum/2-iron combination(2Al/2Fe). Analysis of means supported both hypotheses ($p<.05$): • TDS of electrocoagulated water was significantly lower than control, with 4Al being the most effective. • Coliform of electrocoagulated water was significantly lower than control, with 4Fe being the most effective. • E. coli of electrocoagulated water was significantly lower than control, with all three electrode groups being equally effective. This study concluded electrocoagulation for 30 minutes with the Elequa system was an effective pre-filtration method for TDS, coliform, and E.coli, and those effects were related to the type of electrode used. With its open-source technology and design, the Elequa system can help make clean water more accessible for communities all over the world.

Awards Won: