Using Lanthanum Modified Bentonite to Immobilize Arsenic in Lake Sediments
Abstract

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Lake Killarney contains some of the highest arsenic concentrations in Washington State due to the former ASARCO smelter in Ruston, WA, which emitted arsenic for nearly 100 years. Arsenic is a carcinogen and has been detected in Lake Killarney as well as surrounding lakes. To explore options to reduce arsenic concentrations in these lakes, we tested lanthanum-modified bentonite (EutroSORB-G) to control arsenic release from sediments where it has accumulated in high concentrations. EutroSORB-G is commonly used for phosphorus control. Phosphorus has similar properties to arsenic, so it is possible that lanthanum can be used to immobilize arsenic in lake sediments. In June of 2024 six mesocosms were constructed and placed in Lake Killarney with different duplicate treatments of three concentrations ($0.25 kg/m^2$, $1.0 kg/m^2$, and 0) of EutroSORB-G to monitor its effectiveness for the immobilization of arsenic. Bi-weekly measurements were taken of the temperature, pH, conductivity, and dissolved oxygen from the mesocosms, and filtered and unfiltered water samples were collected to determine arsenic concentration. While a previous laboratory microcosm experiment using the same EutroSORB-G concentrations as this experiment showed promising results, this experiment showed no clear evidence of arsenic immobilization. We observed no decrease in the concentrations of arsenic and phosphorus in the mesocosms, which suggests some potential error within the setup of the experiment itself resulting in a large flux of water in and out of the mesocosm. A redesign of the mesocosms is needed to completely isolate water inside during the extent of the experiment for proper results.