Removing Harmful Nitrates from Bodies of Fresh Water Through Biosorption

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The Mississippi River carries an estimated 1.5 million metric tons of nitrogen pollution into the Gulf of Mexico every year. This pollution has turned more than 18,000 square miles of the Gulf into an uninhabitable "dead zone," posing a biological threat to both aquatic life and humans alike. In order to prevent further damage to ecosystems near the Gulf, new methods of removing these pollutants are needed. This research focuses on a biosorption, the process of using biological matter for ion exchange between dissolved solutes and their solvents, allowing the solute to be absorbed and removed. The purpose of this research is to determine if sphagnum peat is an effective biosorbent for removing nitrates dissolved in Mississippi River water. Water samples were collected from the Mississippi River and tested for initial nitrate levels. After 24 hours, nitrate levels were reexamined. This was repeated for three trials. Using Chi Square statistical analysis, it was found that peat worked to lower the nitrate level by 34%. The second test utilized water samples where only dissolved nitrates and the peat were present. Replicating the same procedure, three different nitrates ($Pb(NO_3)_2$, KNO_3, and $Cu(NO_3)_2$) were tested for three trials each. All three nitrates, showed a decreased in nitrate concentration levels, supporting the hypothesis. This experiment concluded that nitrates dissolved in the Mississippi River can be removed by using sphagnum peat as a biosorbent.