An Assessment of the Use of Multiple Human-Associated Source Tracking Markers to Monitor Fecal Pollution in a Watershed Classified

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Abstract:

Limitations of traditional microbial water quality indicators hinder the identification of potential human sources of fecal pollution. The primary focus of this research was to assess two microbial markers: HF183, a DNA target from Bacteroides dorei (a gut bacterium); and pepper mild mottle virus (PMMoV), a persistent pepper virus present in sewage due to human consumption of pepper products. The ratio of HF183:PMMoV has been proposed to indicate the freshness of sewage contamination in water samples since HF183 is short-lived compared to PMMoV. We hypothesized that the ratio of HF183:PMMoV would also decrease as pollution moves through subsurface soils. We used soil column experiments to simulate the movement of sewage through subsurface soils, mirroring real-life scenarios. We first classified soils gathered from Alvarado Creek in San Diego. A sieve analysis and the Atterberg Limit test were used to determine the soil type according to the Unified Soil Classification System (USCS). The soil was then packed into columns with depths ranging from 1 ft to 3 ft and a 1:1 mixture of sewage and creek water was pumped through the columns. HF183 and PMMoV were measured in 100 mL samples of water leaving the column and the log10 change in the ratio was graphed. According to the USCS, the soil was classified as poorly graded sand with silt. The soil column test resulted in a ratio of HF183:PMMoV that decreased by approximately 0.5 log10 units for each additional foot in the length of the soil column. Insights gained from this research suggest that sewage pollution originating from subsurface sources may exhibit a lower HF183:PMMoV ratio than direct sewage pollution. Therefore, we may discern if fecal pollution in a river has originated from a subsurface source by examining the HF183:PPMoV ratio.

Biography:

Hello, my name is Charisma Tanaka-Herrera I am currently an Undergraduate student pursuing a degree in Environmental Engineering at San Diego State University. Passionate about water management/Quality as well as sustainability and actively engaged in The Safe WATER Lab at SDSU. Strives for excellence in both coursework and extracurricular pursuits, showcasing a commitment to personal and professional growth. Known for effective communication, teamwork, and a proactive approach to challenges. Eager to contribute to the academic community and develop skills for future success in Water Management. As a student in this field, I actively engage in hands-on projects, using skills learned in class to develop innovative solutions for real-world related issues.

My goal is to play a crucial role in contributing to a more environmentally conscious and balanced world so future generations and continue on a greener and greater path.