

Water Quality Parameters: A Comparative Study in a Southeastern Michigan River

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Abstract

This research focused on two sites selected for water quality monitoring along Ecorse Creek in the southern portion of Dearborn Heights, Michigan just outside of the Metropolitan Detroit area. These sites are located within nearby residential areas and located upstream of an urbanized region. The first site is located near a city recreational center and the second site is located in a light industrial and residential area. Water quality parameters tested in this research included nitrates, dissolved oxygen, phosphates, E-coli, and temperature. All data was collected following GLOBE protocols when applicable. Data collection began during August 2024 and continued until early-December. Data was then interpreted and compared to previous data collection from July 2023 to August 2023. Researchers found that as precipitation levels increased, so did the amounts of dissolved oxygen. Additionally, there was a correlation between precipitation and phosphates, with both parameters significantly increasing after the storm, affecting the quality of the Ecorse Creek. The variables tested resulted in notable correlations, demonstrating how environmental factors interact to influence water quality. The researchers extended their research to include additional water quality parameters beyond the GLOBE protocols used. Looking ahead, they hope to further expand their study by collaborating with the Dearborn Heights Steward Watershed Commission to discuss their data and gather input on environmental protection efforts.

Discussion

The study analyzed water quality over an extended period, examining how precipitation influenced changes in dissolved oxygen, phosphates, and nitrates. Results showed that phosphate and nitrate levels were highest after heavy rainfall due to increased runoff, while dissolved oxygen levels fluctuated over time. Researchers identified potential errors, such as equipment miscalibration or contamination, but followed strict protocols to ensure accuracy. At times, excessive fecal coliform levels, likely caused by rainfall-induced runoff, required sample adjustments for accurate testing. The findings highlight the need for better runoff management to reduce pollution and protect water quality. Further research on Ecorse Creek could provide insight into flooding patterns and differences between upstream and downstream water conditions. The study also suggests that regulating phosphate levels from runoff and flooding could improve the creek's habitat, benefiting both aquatic life and recreational use.

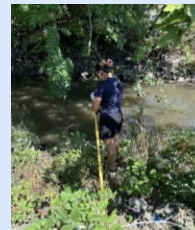
Methodology



The two selected research sites were located within Southeast Michigan's city of Dearborn Heights, one on McKinley St., and one on Van Bom Rd.



Testing for total phosphates using HACH DR/1900 portable Spectrophotometer

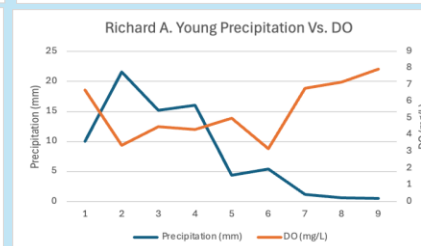
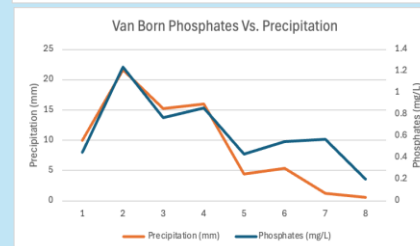
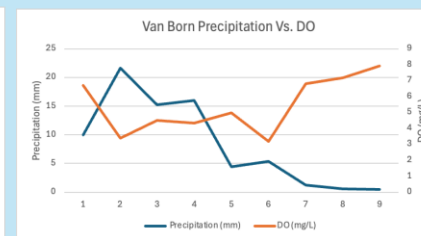
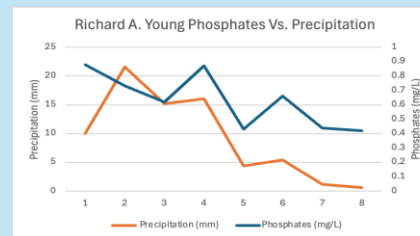


A sample of 32 oz of water from each site was collected to test for dissolved oxygen, and water temperature immediately, using Vernier probes.



Testing for nitrates using the HACH DR 300 Portable Colorimeter device.

Results



Research Question

To what extent have significant rainfall events impacted water quality at two sites along the Ecorse Creek over a two-year period?

Null Hypothesis

There is no significant difference in water parameters over a two-year period following major rain events.

Conclusion

The research from summer 2023 complemented findings from summer 2024, revealing seasonal fluctuations in water parameters. Over nine weeks, researchers studied nitrates, dissolved oxygen, phosphates, and fecal coliform at two testing sites. Lower precipitation in 2024 led to decreased nitrates, while dissolved oxygen levels were lower due to weather differences. Phosphates, tested for the first time, increased with rainfall-driven runoff. Previous research on turbidity, transparency, and total solids showed no significant correlations, leading to a refined focus on more insightful variables. The addition of fecal coliform testing in 2024 further expanded the study, highlighting concerns about the creek's health.

Acknowledgements

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