Analyzing Water Quality in Local Watersheds Through Water Chemistry and Macroinvertebrates

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In the past decade, Cookeville's population has grown by 11%. This rate of urbanization will prove to be harmful to local infrastructure and watersheds. Thus, I wanted to investigate its impact on water quality via macroinvertebrate, water chemistry, and land-use pattern analyses. Macroinvertebrates are often found in freshwater systems and help maintain ecosystem health as decomposers, playing a key role in the food chain. Because they tend to lead short lives, they are accurate indicators of water quality. I began my research by locating sampling points along three local watersheds with unique land-use patterns by stream order through Strahler's Stream Theory. The tenth point is used to prove a point-source pollution scenario by the wastewater treatment plant. At each point, I collected water chemistry data and macroinvertebrates to analyze the water quality. The macroinvertebrate data was used to compile a Biotic Index Score (BIS) to rate water quality. Geographical Information System software was then used to process land-use area, and statistical tests like ANOVA and the t-test were used to prove significant differences. I observed that urbanization negatively impacts water quality as shown by the negative correlation between urban land-use and both BIS and specific conductivity. Also, BIS increased with higher stream orders due to the accumulation of nutrients downstream. A point-source pollution from the wastewater treatment plant was also identified due to urban runoff. My results support my hypothesis that urbanization will bring more pollution to ambient water, but with my proposed plans, these ecosystems can be sustained. Future steps include investigating the relationship between climate change and macroinvertebrate diversity and organic water pollution.

Awards Won:

Fourth Award of $500