Using Lepomis macrochirus Fish Scales as Biological Indicators of Stream Health

Evans, Samson (School: Muhlenberg High School)

A healthy stream is vital to the local ecosystem for many reasons. The stream helps regulate floodwaters, filters pollutants, serves agricultural purposes, and maintains a balanced ecosystem within the watershed. “A healthy stream is an ecosystem that is sustainable and resilient, maintaining its ecological structure and function over time while continuing to meet societal needs and expectations” (Meyer, 1997). Traditional methods of monitoring stream health, such as chemical water testing and physical surveys, are resource-intensive and may fail to capture long-term ecological trends. This research looks at using Lepomis macrochirus fish scales as a biological indicator of local stream health. The removal of fish scales is a non-lethal and efficient way to assess water quality while supplying information about fish growth and environmental exposure. In previous studies, it was observed that pollutants accumulate on the outermost protective layer of the scales, entering the integration system through absorption and gradual erosion of the superstructure of the scales in various ways. Therefore, extensive deformations and progressive damage to the fully developed scale structures are associated with pollutants (Azab et al. 2023). This paper observes how the scales in metal-rich environments exhibit changes and deformations in the shape of the circuli, radii, and other structures that may be due to the experience of stress due to metal pollution or other toxic exposure. The research outlines the advantages of using fish scales in monitoring stream health, discusses the methods for scale analysis as well as the accessibility, demonstrates how not only will fish benefit, but humans will too, and finally, highlights the implications for future environmental monitoring.

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