Investigating Your Watershed: Using Benthic Macroinvertebrates as a Measure of Water Quality

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Abstract

The term "benthic macroinvertebrates" refers to those bottom-dwelling aquatic organisms that can be seen with the naked eye. Many of these organisms reside in the benthos for only a portion of their life cycle, whereas others live out their entire existence in or attached to the streambed. These organisms can be impacted by adverse water quality to varying degrees. Some organisms are said to be "pollution tolerant," which means that they can exist in a wide range of conditions. Other organisms are more sensitive to environmental change and are classified as "pollution intolerant." Most benthic macroinvertebrates are relatively immobile and are unable to escape poor environmental conditions. If the water quality diminishes, the more intolerant organisms will simply die off. By sampling the benthic macroinvertebrate community in a stream and categorizing the collected organisms into different groups based on their sensitivity to pollution, one can determine an overall water quality "index value." These data can be complementary to the types of data obtained from chemical analyses, as they may reflect chronic water quality problems, compared to the acute problems caused by isolated pollution incidents.

The use of benthic macroinvertebrates to determine water quality is one of many exercises used in a non-major course at the University of Maryland, Baltimore County called *Water: An Interdisciplinary Study*. Students in this course work in groups throughout the semester, performing various lab exercises dealing with the chemical, physical, and biological properties of water. They then use these skills to design and complete a group project based on water quality. During one two-hour lab period, student teams sample different regions of the Herbert Run, a stream that runs through campus. Each team identifies a site, and then collects, sorts and preserves organisms for later identification. During a subsequent lab, we discuss classification of organisms and the use of dichotomous keys. Student teams then identify the organisms they collected (to the order level) and, using a provided worksheet, determine the water quality index value for their particular site. Finally, the data and locations for each site are made available online for comparison between sites, and with the chemical analysis data generated during other labs.