Streambed E. coli Alters Microbial Water Quality

Most of the microbial quality regulations and assessments for fresh waters use *Escherichia coli* as an indicator of fecal contamination that may be harmful to human health. Stream and lake bottom sediments contain large numbers of *E. coli*, and sediment resuspension was shown to cause a substantial *E. coli* influx from sediments to the water column during high-flow storm events. However, relatively high concentrations of *E. coli* were also found in stream waters during low-flow periods.

In the January–February 2017 issue of the *Journal of Environmental Quality*, a study was undertaken to see if streambeds may contribute *E. coli* to water during the low-flow periods. Application of the SWAT model to monitoring data from a Pennsylvania stream showed that *E. coli* concentrations in water during low-flow periods could not be satisfactorily estimated when *E. coli* influx to water was attributed only to the *E. coli* transport with runoff from manured fields and pastures without accounting for sediment sources.

Results demonstrate that release of *E. coli* from streambed sediments during low-flow periods is substantial and that water column *E. coli* concentrations strongly depend on not only land management practices, but also on in-stream processes.


Urban Land Use Determines Nitrogen and Phosphorus Vulnerability

Characterization of the vulnerability of water bodies to pollution from natural and anthropogenic sources requires understanding the relationship between land use and water quality. While this relationship has been studied before, the vulnerability to nitrogen and phosphorus as a function of land use has not been examined.

In the January–February 2017 issue of the *Journal of Environmental Quality*, researchers investigate the relationship between land use and vulnerability to nitrogen and phosphorus in a mixed-land use watershed located in the piedmont region of North Carolina where urbanization growth has been observed during the past two decades.

The team found that the vulnerability to nitrogen and phosphorus pollution computed as the probability of exceeding the nutrient standard limits was controlled primarily by urban land use, with higher vulnerabilities during dry years compared with normal and wet years.

The results of this study have important implications with regard to identifying the sources of pollution that determine the vulnerability of water bodies. Such findings can be used in decision making for water quality management. Targeting the conservation efforts to pollution sources that contribute highest to the water quality impairment can result in more effective and efficient policies.


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Worth 1,000 Words

Each month, we highlight a photo that demonstrates great techniques to illustrate research. This month, we thank Silja Hund for this photo of hydrologic monitoring. This photo shows equipment on site. The river bank illustrates the variable stream flow, and the dog in the background gives a sense of scale.

Read the web story about Brown’s research here: www.soils.org/discover-soils/story/water-resilience-flows. Don’t let those photo opp moments pass you by! Keep your camera, or cell phone, ready to capture the exciting visuals of your science!

The automated dataloggers can be used for long-term monitoring, as well as for temporary monitoring used to estimate stream flow, as seen in this photo from the Potrero River, Costa Rica. Photo by Silja Hund.

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