

DEVELOPING ECOLOGICAL INDICATORS FOR NUTRIENTS AND URBAN IMPACTS TO STREAMS IN COASTAL WATERSHEDS.

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Increased nutrient loads associated with human activities are among leading causes of impairment to streams and receiving waterbodies. For streams draining to the environmentally and economically important Narragansett Bay estuary, we developed indicators based on (1) nitrogen and carbon stable isotope ratios of periphyton and macroinvertebrates and (2) microbial enzyme activities. Streams tended to be P limited, as indicated by ratios of nutrient concentrations and high microbial phosphatase activity, which decreased as TP concentrations increased. Nitrate concentrations significantly increased with human sources associated with urban land cover. Increased nitrate concentration were significantly correlated with greater $\delta^{15}\text{N}$ in periphyton and multiple trophic levels of macroinvertebrates, making them potentially useful indicators that also provide insight into changes in food webs. Microbial respiration decreased as the ratio of glycosidases to oxidases decreased, potentially indicating lower quality of DOC in urban streams. Stable isotopes and macroinvertebrates indicated that vegetated riparian buffers likely had important benefits for ecological communities, even in moderately urban streams. Lastly, landscape indicators are being developed using GIS to characterize how spatial patterns of land cover are linked to stream conditions.

Impact statement:

Watershed development is a leading cause of stream impairment. This research examines how watershed development affects periphyton and macroinvertebrates by altering the sources and concentrations of nutrients, carbon, and stressors. Results can be used to develop indicators and inform monitoring and management decisions.