Geophysical Research Abstracts, Vol. 7, 10535, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10535

Dissecting hydrologic and land-use controls on nutrient retention in human-altered streams

E. Marti (1) and the STREAMES team
(1) CEAB-CSIC, Blanes, Spain

Headwater streams are a crucial component of lotic networks. Besides being tightly connected with the adjacent terrestrial environment, local biogeochemical processes operating in these headwaters can influence downstream ecosystems such as rivers, estuaries and coastal waters. Despite their small dimensions, pristine headwater streams can retain and/or transform substantial proportions of the nutrient inputs from the catchment, which underscores their role as biogeochemical hot spots regulating nutrient dynamics at the landscape level. A largely unresolved question remains whether streams in human-altered catchments share this capacity to effectively retain and process nutrients from diffuse and point sources — both pervasive results of urbanization, agriculture, and other land uses.

In this paper, we report on nutrient retention efficiency in human-altered streams, and on variation with catchment land use and scaling to hydrology. Our analyses are based on more than 100 experimental, whole-stream additions of nitrate (NO_3), ammonium (NH_4), and phosphate (PO_4) along with a conservative tracer (Cl) in 11 streams receiving effluents from wastewater treatment plants (WWTP) and draining headwater catchments with contrasting land use throughout Europe. Our results illuminate the effects of land use and channel geomorphology on stream nutrient retention efficiency. They also suggest that increasing agricultural land use increases nutrient export from small catchments not only through increased diffused inputs but also through channel alterations. These results have broad implications for ecosystem science and restoration ecology.