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Eawag Seminar Invitation

Factoring Physics into Local and Global Assessments of Nitrogen Pollution

Speaker **Stanley B. Grant,**
Professor of Environmental Engineering, University of California, Irvine

When **October 27, 11.00 – 12.00 a.m.**
Where **Forum Chriesbach, room C20, Eawag Dübendorf**

Abstract The discharge of excess nitrogen to streams and rivers poses an existential threat to both humans and ecosystems. A seminal study of headwater streams across the U.S. (the second Lotic Intersite Nitrogen eXperiment or LINX II study) concluded that in-stream removal of nitrate is controlled primarily by stream chemistry and biology, and only weakly by stream physics. A reanalysis of these data reveals that stream physics (in particular, turbulent mass transfer across the concentration boundary layer) imposes a previously unrecognized upper limit on the rate nitrate is removed from streams. The upper limit represents the potential (mass-transfer limited) capacity of a stream to remove nitrate, while the fraction of that potential realized in practice is determined by stream chemistry, biology, and hydrogeology. Physics alone closely reproduces measured distributions of nitrate removal in headwater streams, a discovery that should inform stream restoration designs and efforts to assess the impacts of nitrogen pollution on receiving water quality and the global nitrogen cycle.