

Legacy nitrogen meet wetland restoration: Solvable problem or fool's paradise?

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Human activities have greatly accelerated nutrient cycles, with excess nitrogen and phosphorus from agricultural intensification and urbanization leaching to surface and groundwater. These elevated nutrient levels contribute to persistent water quality issues, including eutrophication and increasing algal blooms. While new policies have been developed to address excessive use of nutrients, poor water quality remains a persistent problem in our lakes and streams. Climate change exacerbates the challenge, as warmer winters are increasing nutrient release from soils.

One of the challenges in addressing regional scale non-point source pollution lies in identifying the largest sources, and the most effective sinks that can protect downstream waters. My talk will explore how chemical and isotopic signatures in soil and water can help distinguish between legacy nutrients and current inputs affecting water quality. Additionally, I will examine the potential of various physical, chemical and isotopic signatures to quantify the potential of different wetlands for nutrient restoration, and whether wetland restoration can be a viable strategy to meet water quality targets. Using large-scale data and innovative analytical approaches, I will identify key pollution drivers and highlight opportunities for practical solutions to our ongoing water quality challenges.