

Denitrification in Headwater Wetlands with Varying Surrounding Land Cover Types

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Wetlands are recognized for their significant role in providing a range of ecosystem services. In light of this, research is currently being performed to characterize how forcing functions (e.g., climate change and land cover change) affect the provision of ecosystem services by wetlands. Denitrification is an ecosystem service, providing a pathway of nitrogen (N) removal from the biosphere. We assessed denitrification across headwater wetlands in Pennsylvania and Ohio that varied in surrounding land cover. Our objective was to evaluate whether surrounding land cover type affected denitrification rates. We used three methods to estimate denitrification. The acetylene inhibition method and the $\delta^{15}\text{N}_{\text{groundwater}}$ tracer push-pull method were used to measure denitrification potential. $\delta^{15}\text{N}_{\text{soil}}$ isotopic composition of bulk soil was used as an indicator of long-term N processing. Fall 2011 results suggest that denitrification does vary across land cover types; for example, the push-pull method shows a decrease in denitrification potential rates from developed ($203 \pm 38 \mu\text{g-N kg soil}^{-1}\cdot\text{day}^{-1}$) to urban ($174 \pm 18 \mu\text{g-N kg soil}^{-1}\cdot\text{day}^{-1}$) to forested ($108 \pm 16 \mu\text{g-N kg soil}^{-1}\cdot\text{day}^{-1}$) land cover types. However, we expect that the results are method dependent. We are developing structural equation models for denitrification in wetlands across the land cover gradients, to identify probable forcing functions and to elucidate relationships among stressors associated with land cover and site-level physiochemical properties. Ultimately, we will test the transferability of these models to headwater wetlands with similar land cover types in Oregon.

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