

QUANTIFYING MECHANISMS DRIVING NUTRIENT DYNAMICS IN STORMWATER PONDS ACROSS AN AGE GRADIENT

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Stormwater ponds (SWPs) provide valuable ecosystem functions such as flood mitigation and pollutant removal from stormwater runoff. Due to their potential to impair downstream water quality, nutrients are commonly targeted for removal within SWPs. Although there are a variety of nutrient removal processes, denitrification is a particularly important nitrogen (N) removal mechanism as it converts bioavailable nitrate (NO_3^-) to nitrogen gas (N_2) gas, permanently removing N from the system. Denitrification is commonly coupled with N fixation, in which N_2 is converted into bioavailable ammonium (NH_4^+), representing an addition of N to the system. Studies quantifying N dynamics via mass balance approaches are common in SWPs, but research on the biogeochemical mechanisms driving nutrient flux in SWPs is lacking. To better understand the mechanistic drivers of SWP nutrient cycling, we collected sediment cores from residential stormwater ponds ranging from 10 to 30 years old in Gainesville and Miami during winter and summer seasons. Using these cores, we performed continuous flow core incubations, where sediments were exposed to both ambient and elevated water column NO_3^- levels. We quantified net N_2 fluxes (via membrane-inlet mass spectrometry) and dissolved inorganic nutrient uptake. Under ambient nitrate levels, pond sediments were equally likely to add N, due to N fixation, or remove N, due to denitrification, from the water column. However, under NO_3^- enriched conditions we observed a shift from net N fixation to denitrification and an increase in the rate of denitrification across 7 of the 8 ponds sampled. We also observed a relationship between NO_3^- uptake and denitrification, suggesting that denitrification was responsible for a large portion of total NO_3^- uptake. Results of this research will provide a mechanistic understanding of nutrient dynamics within SWPs, allowing for development of targeted management actions for enhanced nutrient removal.

PRESENTER BIO: Steven Hohman is a 2nd year M.S. student in the Urban Ecosystem Ecology Lab working with Dr. AJ Reisinger. He is researching the effects of external and internal drivers on nutrient cycling within stormwater ponds, with an emphasis on how these drivers impact the rate of denitrification within stormwater ponds.