Factors Influencing Microplastic Abundance in Stormwater Basins

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Microplastics (MPs) and nutrients are both common anthropogenic pollutants that enter freshwater aquatic systems, particularly stormwater basins and partially excavated lakes. In addition to having common sources (i.e., adjacent human development) MPs may directly hinder nitrogen (N) uptake, alter microbe communities and pathways, and reduce N and phosphorus (P) removal in freshwater systems, possibly leading to an increase in N and P concentrations in the water column. However, it is unknown if there is a correlation between MP abundance and concentrations of N and P in stormwater basins and lakes. Moreover, this study seeks to understand if the concentrations of these pollutants vary spatially within a basin (based on proximity to development) and between basins. Microplastic type and abundance, along with nitrate and soluble reactive phosphorus (SRP) concentration, will be quantified in the water column of at least five stormwater basins and two lakes. To limit plastic contamination of the samples, glass bottles will be used to obtain water samples. Once returned to the lab, samples will be poured through a gridded filter using vacuum filtration and using foil to cover all open areas containing samples to avoid contaminants in the air. The microplastics on the gridded filters will be placed under the macroscope, counted, and separated into fragments, fibers, or beads. Nutrient concentrations will be quantified colorometrically with a discrete water analyzer. A positive correlation between MP abundance and nutrient concentration is predicated, as well as a direct relationship between MP abundance and proximity to anthropogenic development. This research will help land managers recognize the relationship between MPs and nutrients to determine if one can be used to predict the other and will improve knowledge for overall pollution management.