

Assessment of the Ecosystem Services of Rain Gardens

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ABSTRACT

Stormwater runoff from impervious surfaces contributes to degradation of urban stream ecosystems. Impacts include increased flooding, water quality impairment, and disruption of habitats. Rain gardens are a type of green infrastructure designed to mitigate the adverse effects of stormwater runoff by promoting evapotranspiration, reducing peak flows, and retaining pollutants. Rain gardens can provide additional ecosystem services, defined as benefits that ecosystems provide to people. This includes, but is not limited to, increasing biodiversity by providing habitat, creating green spaces for recreation, and storing carbon. To date, little research has been done integrating these multiple services. My research measured water quality, nutrient processing rates, soil carbon and plant diversity at three rain garden sites in Lafayette and West Lafayette, Indiana. Plant diversity was measured by species richness and the Shannon Weiner index. Water quality was measured by testing runoff and groundwater samples for pollutant concentrations. Soil carbon and denitrification rates were measured in surface soil. Plant composition varied by site, as did soil carbon concentration. Nitrate and phosphate concentrations were higher in groundwater than in runoff, and pollutant concentrations varied by site. My results highlight opportunities for enhancing multiple ecosystem services provided by rain gardens.

KEYWORDS

Green Infrastructure, Rain Gardens, Ecosystem Services, Plant Diversity, Soil Carbon, Water Quality