The Effects of Compost and Vegetation on Bioretention Stormwater Treatment and Soil Phosphorus Distribution

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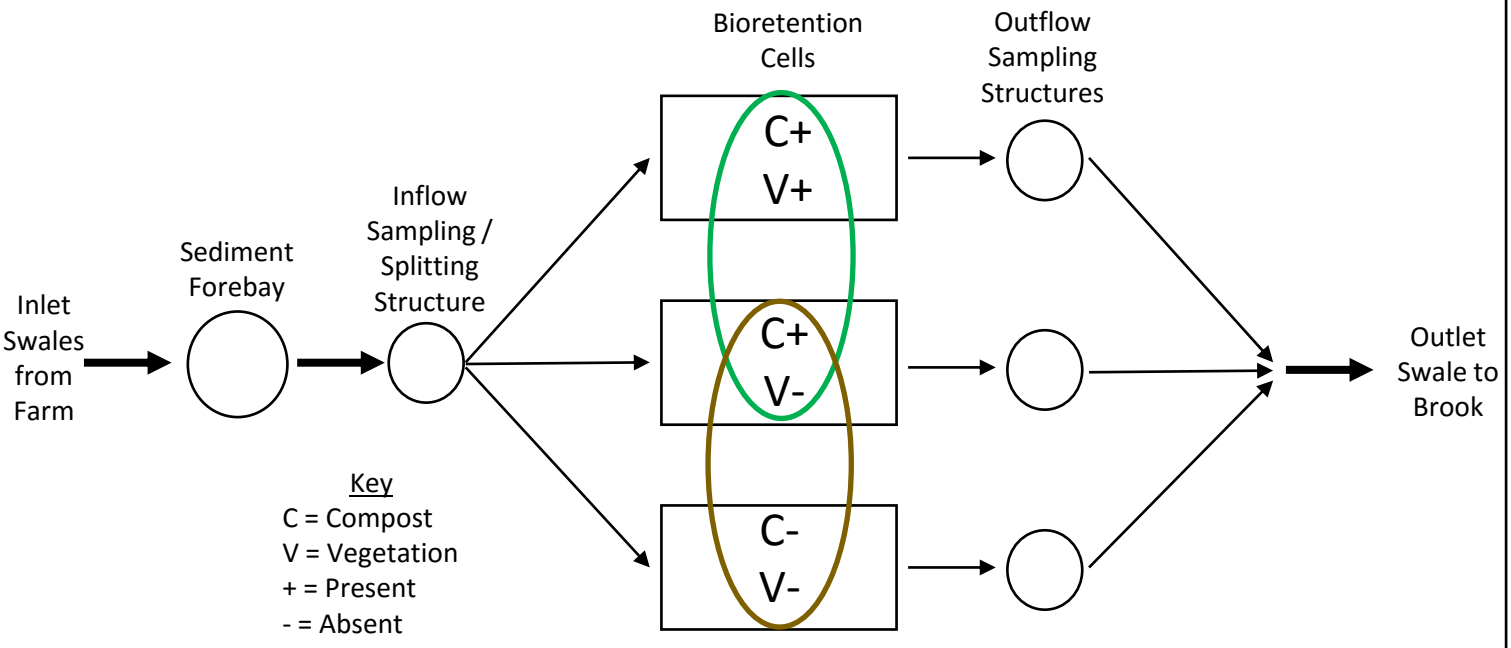
- Abstract

Bioretention, one of the most common forms of Green Stormwater Infrastructure, can be used to capture and store runoff, allowing treatment *in situ* through natural vegetative and soil processes. While bioretention is commonly recommended as a best management practice, there is a growing need to understand how critical design components affect treatment efficiency. Our research explores the effects of compost and vegetation on the ability of bioretention cells to remove nutrients (Nitrogen and Phosphorus) and total suspended solids (TSS) from stormwater runoff. In May 2016, three large bioretention cells were installed at the University of Vermont Miller Research Complex, comprising of a mixed agricultural, institutional, and suburban landscape. In this system, the cells receive runoff from a common influent source and discharge treated effluent through three separate outflow structures. The experimental treatments of the cells include Vegetation with Compost, Vegetation without Compost, and No Vegetation or Compost, allowing for an isolation of the variables' effects. Beginning June 2016, influent and effluent pollutant concentrations will be monitored during storm events to determine the extent to which the presence of vegetation or compost affects their removal. Additionally, we will analyze bioretention soil samples from five different depths within the cells to determine if the treatments affect the change in soil phosphorus concentration, availability, and sorption capacity. Together, the results of the soil and water quality measures will provide a quantitative measure of the impact of vegetation and compost on bioretention treatment efficiency and increase our overall understanding of this technology's removal mechanisms. We expect our results to be a valuable addition to the literature of Green Stormwater Infrastructure and provide stormwater managers with the knowledge required to make appropriate decisions planting and soil amendment in future bioretention projects.

The UNIVERSITY of VERMONT

UVM Miller Research Center Bioretention Cells

Flow Diagram and Experimental Treatments



Vertical Cell Profile and Soil Sampling Depths