Report as of FY2006 for 2006AL50B: "Evaluating Bioretention Nutrient Removal in a Rain Garden With and Internal Water Storage (IWS) Layer"

Publications

- Conference Proceedings:
  - Dougherty, Mark, Charlene LeBleu, Eve Brantley, Christy Hartsfield, April 9-12, 2007, Evaluating Bioretention Nutrient Removal in an Urban Rain Garden, in Emerging Issues Along Urban/Rural Interfaces: Linking Land-Use Science and Society, Auburn University Center for Forest Sustainability, Atlanta, GA.
  - Dougherty, Mark, Charlene LeBleu, Eve Brantley, Christy Hartsfield, June 17-20, 2007, Evaluation of Bioretention Nutrient Removal in a Rain Garden with an Internal Water Storage (IWS) Layer, in ASABE Annual International Meeting, ASABE, Minneapolis, MN (Paper #077085)
  - LeBleu, Charlene, Mark Dougherty, Eve Brantley, Christy Hartsfield, August 15-19, 2007, Assessing Nutrient Reduction in a Rain Garden With an Internal Water Storage (IWS) Layer, in The Council of Educators in Landscape Architecture (CELA) Annual Meeting, Council of Educators in Landscape Architecture, State College, PA.

Report Follows

Project Synopsis

Title: Evaluating Bioretention Nutrient Removal in a Rain Garden with an Internal Water Storage (IWS) Layer.

Funding period: March 1, 2006 - February 28, 2007

Investigators:
- Dr. Mark Dougherty, Assistant Professor, Auburn University Department of Biosystems Engineering, Auburn, AL
- Ms. Charlene LeBleu, Assistant Professor, Auburn University Landscape Architecture & Community Planning, Auburn, AL
- Ms. Eve Brantley, Alabama Cooperative Extension System, Water Quality Program, Auburn, AL
- Ms. Christy Francis, Former Curator, Arboretum/Biological Sciences, Auburn, AL

Statement of the problem and research objectives;

Stormwater runoff has been identified as a major source of pollution in urban and suburban streams. There are several innovative stormwater practices that integrate stormwater infiltration and storage to improve the quality of runoff, including bioretention areas such as rain gardens. This paper reports first year results comparing two different bioretention (rain garden) designs constructed at the Donald E. Davis Arboretum on the Auburn University campus, one using conventional, aerobic treatment and the other incorporating an internal water storage (IWS) layer.

An explanation of the research methodology used;

The rain garden demonstration-research project described in this paper is located at the Auburn University Arboretum in Auburn, Alabama. Construction of two rain gardens was completed in the summer of 2006. During the research monitoring portion of the study, predetermined volumes of stormwater runoff from campus are designed to be pumped into two rain gardens for collection, treatment, and analysis. At the conclusion of all controlled research, diversion berms installed above each rain garden will be removed to provide functional stormwater management and bioremediation for the Arboretum grounds. Although the two rain gardens were constructed at the same time, rain garden #1 had to be re-excavated in September 2006 to due improper drainage installation. Consequently, only raingarden #2 (RG #2) is used for the current study. Monitoring of RG #1 is scheduled to begin in summer 2007.

Principal findings and significance;

Initial evaluation of outflow from the newly installed rain garden #2 revealed several trends directly related to the chemical and physical properties of the fill media. Results support what is known in the literature about the linkage between outflow rain garden

water quality and the inherent soil properties of the fill media. In addition, it was observed that settlement and consolidation of in-place rain garden media immediately following construction resulted in gradually reduced outflow peaks during the 6-month study period from July through December 2006. Significant removal of particulate phosphorus and total phosphorus constituents was found under both conventional and IWS operation of the rain garden and some beneficial nitrogen removal was also detected from the IWS layer towards the end of the study. Beneficial hydrologic effects of the rain garden included significantly reduced outflow hydrograph peaks and reduced total outflow volumes, both effects which would act to reduce total contaminant load to receiving waterways. In addition, within six months after construction, the peak outflow from the rain garden was seen to decrease until a near steady-state outflow was achieved.