Evaluating the Effectiveness of Bioswales in Southeast Michigan

Grace Crowe
Wayne State University, fr9792@wayne.edu
Evaluating the Effectiveness of Bioswales in Southeast Michigan
Specific to the Treatment of WSU Parking Lot Runoff

Timothy Dittrich
Civil and Environmental Engineering

Opportunity and Significance
Bioswales are modern storm water management structures that utilize biological components in a traditional swale to more effectively filter out contaminants. Because of its modern nature the installation and management practices for bioswales is still developing. Perfecting the practices surrounding bioswales in southeast Michigan environment can aid in the advancement of green infrastructure in the state.

Technical Objectives
Wayne State installed a bioswale in one it's parking lots in New Center, with the help of the Detroit Biodiversity Network (DBN). We wanted to utilize this existing bioswale and monitor its progression throughout the year. We wanted to see how different components effecting bioswale performance withstood through out the year. The quantitative and qualitative data collected will be used to aid the development of southeast Michigan specific practices.

Technical Approach
We monitored:
- Soil pH because of its effect on metal filtration
- Soil composition because of its effect metal contamination of groundwater.
- Vegetation because of its vital part in the biological filtration
- Drainage patterns because it effects the integrity of the bioswale

The soil pH did not vary a large amount over the winter. It did fall on the higher end of the optimal pH for filtering out metal (6.5-8.5).

The soil composition consists of clay and loam predominantly. This indicates that the filtered metal will accumulate in the top several inches of the soil. Not threatening groundwater supplies.

The vegetation was carefully selected by DBN, the plants are native to Michigan and have filtration/absorption abilities. The plants where sparsely placed and died with the weather however. More coverage greatly increase the filtration capabilities of the bioswale so in the colder months the bioswale become less effective.

The drainage patterns indicate problems with the mulch top layer. It was being carried off the bioswale onto the storm water grate. This could effect the detention rate, flow rate, TSS concentration, and plant prosperity.

References
State of Organ DEQ: Biofilters for Storm Water Discharge Pollution Removal

Next Steps for Development and Test
- Continue to monitor soil pH throughout the year to see if it varies in different seasons.
- Monitor metal concentration in top soil to better understand effects of metal accumulation.
- Monitor the salinity of the soil to understanding road salt's effect on detention.
- Develop methods of storm water collection during first flush to monitor TSS and hydrocarbon filtration.
- Develop methods to track the detention rate.
- Research winter resistant plants that have filtration capabilities.
- Incorporate grasses into vegetation to decrease mulch runoff and increase vegetation coverage.

Commercialization Plan & Partners
I worked with Dr. Timothy Dittrich on this project.

This research is in the early stages of data collection. Before commercialization can be begin more data needs to be collected, methods developed, and research conducted. Once we are in the commercialization phase we plan to present a step by step process for creating a more efficient bioswale, improving existing bioswales, and methods for monitoring and maintaining bioswales in the urban Michigan environment.