Investigation of Bioretention Effects on Water Quality

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ABSTRACT

Population increase and urban sprawl have adverse effects such as flooding and water pollution on both surface water and ground water resources. Although, point source pollution may be controlled by using conventional treatment systems, non-point source pollution is a big problem for water resources. Therefore, conducting studies related to prevention of non-point source contamination is essential. For this purpose, Low Impact Development (LID) Best Management Practices (BMPs) have become popular for collection, infiltration, and treatment of toxic metals and other pollutants in storm water runoff in recent years. LID-BMP is a land planning method which is used to manage storm water runoff and improve water quality by reducing contaminant in storm water runoff that is mixed into the ground water via seepage and infiltration. This study contributes to these research efforts by seeking for the media effects of bioretention, which is a LID-BMP type, on heavy metal removal. The aim of this study is developing a functional experimental setup called as Rainfall-Watershed-Bioretention (RWB) System in order to investigate and quantify the water quality performance of bioretention. RWB System is constructed on the Istanbul University Campus and includes an artificial rainfall system, which allows for variable rainfall intensity, drainage area, which has controllable size and slope, and bioretention columns with different soil ratios. Four bioretention columns with different soil textures and organic content are constructed in order to investigate their effects on water quality. Using RWB System, three types of heavy metals, which are Cu, Pb and Zn, are spread on the RWB drainage area, and the synthetic pollutographs are obtained at the inlet and outlet of each bioretention column under different artificial rainfall events. The performance of bioretention columns in improvement of water quality is investigated by comparing the inflow and outflow pollutographs.

Key words: Best Management Practices; Bioretention; Water Quality