



## Water quality model for non point source pollutants incorporating bioretention with EPA SWMM

Sezar Gülbaz

*Istanbul University-Cerrahpaşa, Department of Civil Engineering, Avcılar, 34320, Istanbul, Turkey, Tel. +90-212-473-70-00/17941, Fax +90-212-473-71-80, email: sezarg@istanbul.edu.tr (S. Gülbaz)*

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### ABSTRACT

The first aim of this study is to develop a calibrated water quality model of the non-point source pollutants over the experimental drainage area. And, the second aim is to incorporate the bioretention into the water quality model to observe its performance on pollutant removal. The study makes use of the Environmental Protection Agency Storm Water Management Model (EPA SWMM) which is being described in literature as a reliable software tool, and of the Rain fall-Watershed-Bioretention (RWB) System which is a previously developed experimental system that consists of an artificial rainfall system, drainage area and bioretention column. Within this scope, zinc (Zn), copper (Cu), lead (Pb), total nitrogen (TN) and total phosphate (TP) are defined as pollutants in the model. Bioretention is then integrated into the model, and all values related to bioretention are entered in the program. Hydrographs and pollutographs, showing the effects of non-point source pollution sources at the outlet of the drainage area, are obtained from the model before and after bioretention implementation. The values measured at the outlets of the drainage area and bioretention are compared with the results obtained from the model, and the model is calibrated accordingly. Based on the calibration results, the pollutant build-up and pollutant wash-off coefficients are obtained for the water quality model. Moreover, the effect and performance of bioretention on the quality of surface runoff are examined by evaluating the results of the model and the experiment. It is observed that the reductions of peak flow and of water contamination are very high after bioretention. Moreover, it is concluded that although the non-point source pollution model performance of EPA SWMM without bioretention is successful in representing peak concentration and the shape of the pollutographs, the model performance with bioretention needs further improvement.

*Keywords:* Pollutant build-up; Pollutant wash-off; Water quality model; Bioretention; EPA SWMM; Storm water treatment

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\*Corresponding author.