Evaluation of the Stormwater Capture Potential of New York City Soils: Implications of Infiltration Rate Variability on Urban Runoff Predictions

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Background
The properties used to characterize soils and, more specifically, those that are used to describe the rate at which water infiltrates into them, are key parameters in most rainfall-runoff models. Because these parameters are known to be highly variable, they are a known source of uncertainty in predicting runoff from pervious surfaces.

Research Goals
The goals of this study were to a) characterize the heterogeneity in soil and infiltration characteristics in specific types of pervious surfaces found in New York City, and b) to study the potential effect of this heterogeneity on prediction of the total volume and peak rate of runoff from specific rainfall hyetographs.

Methodology
Characterization of soil and infiltration characteristics, utilizing a Cornell Sprinkle Infiltrometer, was performed at a variety of sites throughout NYC during Summer and Fall 2009.

- NYCDDP Green streets (11 tests)
- Tree pits (5 tests)
- Vegetated Courtyards (7 tests) - Backyards, traffic islands, courtyards

Statistical Analysis
As expected, statistical analysis of the infiltration data, which includes nearly two dozen individual tests, showed high variability and statistically significant differences (t-testing) between land surface types.

SWMM Modeling
The USEPA Stormwater Management Model (SWMM), an industry standard, was then used to examine the impact of this heterogeneity on predictions of peak flow and total runoff volume for a design storm.

SWMM Results
The preliminary results of this work suggest that although soil and infiltration properties are highly variable, only a small portion of this range can significantly alter the runoff predictions obtained from SWMM using this particular design storm.

Future Research
Future research will address the significance of the variability in runoff predictions given a more diverse set of storm events for more generalizable results.

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