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An integrated decision support tool (i-DST) for urban stormwater management: Model framework and recent developments for grey-to-green infrastructure scenario testing

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Title: An integrated decision support tool (i-DST) for urban stormwater management: Model framework and recent developments for grey-to-green infrastructure scenario testing

Authors: Colin D. Bell, Elizabeth M. Gallo, Katie Spahr, John McCray, and Terri S. Hogue

Abstract:

Accurate estimation of the performance and life cycle cost of stormwater infrastructure alternatives is important for municipalities prioritizing potential projects that can meet multiple objectives. These objectives include water quality permit compliance, reduction of stormwater runoff and peak flows, and maximization of additional environmental and social benefits provided by the infrastructure. This work gives a brief overview of an integrated decision support tool, called i-DST, that is currently being developed to estimate the capability of different infrastructure alternatives to meet these objectives. The i-DST framework leverages the hydrology, water quality, and optimization routines of the EPA System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN), but also includes modifications such as a new graphical user interface, the ability to simulate grey stormwater infrastructure techniques in addition to green, and post-processing algorithms to compute and visualize additional environmental life cycle impacts and social co-benefits. This work summarizes the general framework of i-DST, and demonstrates some of the added functionality. Additionally, this work applies a preliminary version of the i-DST to an urban watershed in Los Angeles, CA to evaluate the tradeoffs between cost, peak flow reduction, and metals load reduction for different distributed grey and green infrastructure scenarios. Model output is then put into a multi-criteria decision analysis matrix to demonstrate how the i-DST assists municipalities in their decision making process.