Best management practices (BMPs) site selection for reducing urban surface runoff at target locations

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ABSTRACT

Urban development generally tends to reduce the permeability of urban surfaces resulting in significant increase of stormwater volume and discharge. The volume and peak surface runoff may be effectively controlled in urban areas by using Best Management Practices (BMPs), the selection of which and its spatial arrangement is a challenging task. In this regard, Tehran metropolitan is trying to assess the effect of BMPs in reducing total runoff in developing zones. In this paper, the effectiveness of biological and structural BMPs exposed to different design rainfalls is investigated under several scenarios via Storm Water Management Model (SWMM). According to the results, the amount of reduction in the surface runoff volume closely depends on the type, area coverage and location of BMPs. Proper selection of BMPs in 2, 5 and 10 years return periods results in reduction of runoff volume by 68%, 60% and 51%, respectively. Furthermore, by reducing the surface areas of implemented BMPs for 50% and 25%, the total runoff volumes decrease up to 33% and 45%, respectively. A ranking index is also proposed for sub-watersheds in relation to their contribution in the total runoff reduction. Such index is quite effective in determining the appropriate BMPs sites within the whole urban region.

Keywords: Urban surface runoff; Best management practices (BMPs); Storm water management model (SWMM); Site selection; Runoff volume; Tehran

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