

Improvement of Drainage Efficiency of the Most Contributed Catchment of Mahaiyawa Tunnel Drainage Canal, Kandy

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The study employed the Stormwater Management Model (SWMM) to assess the impact of implementing best management practices (BMPs) in an upstream mountainous catchment, aiming to decrease peak flow rates and prevent downstream flooding in the Mahiyawa Tunnel area in Kandy, Sri Lanka. The entire catchment leading to the Mahaiyawa tunnel Drainage canal comprises four primary sections, each delineating distinct drainage paths from Udawatta Kale, Asgiriya, Old Matale Road, and Welikanda. The research specifically focused on the Udawatta Kale sub-catchment, which constitutes 42% of the area. Data collected during field visits facilitated the development of the SWMM model, incorporating spatial coordinates, average slope, invert level elevations, canal cross-section dimensions, and precipitation time series data. After thorough analysis, it was discovered that the selected sub-catchment consisted of two outlets. A carefully considered drainage channel with a consistent section and significant upper catchment coverage was selected for calibration during the conducted field visits. Field measurements were used for calibration, including velocity and water depth in a conduit near Outfall 1, along with rainfall data from the Udawatta Kale rain gauge. After comparing the measured values with the model outputs, modifications were made to various parameters such as roughness values, slopes, widths, and infiltration characteristics so that the results showed good agreement with the relative error remaining under less than 10%. The validated model was then utilized to explore the impact of various Best Management Practices (BMPs) on the considered catchment under ten different scenarios. As a result, detention ponds emerged as the most effective solution to improve drainage paths, indicating a significant reduction of 40% in peak flow according to the model output.

Keywords: SWMM (Stormwater Management Model), Validation, Best Management Practices (Bmps), Urban Runoff

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