Influence of Low-Impact Development in Flood Control: A Case Study of the Febres Cordero Stormwater System of Guayaquil (Ecuador)

Quichimbo Fabian, Escuela Superior Politécnica del litoral (ESPOL) Guayaquil, EC

Abstract

Urban flooding is a major problem in many coastal cities. The rapidly shifting patterns of land use and demographic increase are making conventional approaches to stormwater management fail. In developing countries such as Ecuador, a lack of monitoring, financial constraints and absence of proper policies exacerbate flooding problems. This work assesses the implementation of two Low Impact Development strategies (LIDs), namely, green streets and rain barrels, as nature-based solutions to mitigate flooding problems. The use of the "Stormwater Management Model" (SWMM) helped to contrast the new approach with the current state of the drainage system, including normal and extreme scenarios. With an implementation of 1.4% (19.5 ha) of the total area with LIDs, the reduction of runoff for short events (200 min) is around 20%, and for extreme events (within 24 h) is around 19% in comparison to the conventional approach. Flooded nodes were reduced to 27% for short events, and to 4% for extreme events. The peak flooding system had a reduction to 22% for short events and 15% for extreme events. These highlights help to increase city resilience, and authorities and stakeholders should engage in climate actions to reduce flood risks complementing drainage operations with nature-based solutions. Moreover, calibrated results in this article serve to increase awareness among municipal authorities regarding the importance of maintaining flooding records to improve modelling results for decision-makings processes.



Biography

Fabian Quichimbo is a Civil Engineer graduated from Escuela Superior Politécnica del Litoral (ESPOL) -Ecuador., He Is MSc (c) at full time at the Universidad de Cuenca-Ecuador. Fabian is also a member of the academic chapter ACI-ESPOL and ASCE-ESPOL. His research broadly focuses on sustainable measures and adaptation to climate change, also to the study of the catchment hydrologist and the measure of streamflow generation on urban and natural catchments. The aims is to get a better understanding catchment functioning and the variability of hydrological behaviors across different temporal and spatial scales.

Email: flquichi@espol.edu.ec

Notes/Comments: