

Modeling of Urban Watersheds and Stormwater Best Management Practices

Background

Central Texas is in the path of weather from the Gulf of Mexico and the Pacific coast of Mexico. Therefore, when Austin has heavy rainstorms, creeks often flood. There may also be flooding in streets, buildings and yards. Flooding can be hazardous for people and property. In highly urbanized areas such as Austin, impervious or built areas produce instantaneous runoff in response to heavy rainfall. This sort of quick response has to be controlled to avoid flooding, high erosion and the associated transport of pollutants to the nearby river or lake. Structural stormwater best management practices can be helpful under these circumstances.

Study Area Description

Austin is one of the few cities that studies each of its creeks for flooding, soil erosion and water quality. Austin and its sub-urban area are divided into 66 creek watersheds, most of which enter the Colorado River at Lake Austin or Town Lake before flowing to the Gulf of Mexico. Most of these creeks have excessive flow during heavy rains and dry up shortly afterwards. Most of the downtown and the surrounding watersheds consist of highly developed land such as roadways, parking lots, single, multi-family residences, and shopping centers. When it rains, water quickly runs off these hard surfaces to a stormdrain, picking up pollutants as it travels. It then flows through underground pipes, which lead directly to creeks.

Addressing the Problem

Quick response to rainfall from impervious surfaces increases the chances of flooding and stream bank erosion in creeks. Structural stormwater best management practices are required to capture some of the runoff, attenuate the flood peaks, and remove a portion of the pollutants before they reach the creek. Some of the commonly followed stormwater best management practices are given below:

- Detention basin
- Retention Irrigation
- Wet pond
- Sedimentation Filtration Pond
- Porous pavement
- Infiltration basin
- Grassed waterway
- Filter strip

This project uses the Soil and Water Assessment Tool (SWAT) model to simulate the hydrology of urban watersheds. As a part of this project, tools will be developed for: (a) rainfall-runoff modeling at sub-hourly time steps, and (b) representing the stormwater best management practices and analyzing their effects on downstream water quantity and quality.

Partners

- Texas AgriLife Research
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