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Designation :

Title : Evaluation Measures for Mitigation of Flood and Pollution in Small Urban Watershed: South Chennai

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Chennai is the capital city of the Indian state of Tamil Nadu located on the Coromandal Coast of the Bay of Bengal. Chennai is the fourth most populous metropolitan area and the fifth most populous city in India, and also the world's 36th largest metropolitan area. Chennai had a population of 4.34 million according to the 2001 census within the area administered by the Corporation of Chennai and an extended metropolitan population of 6.5 million. The urban agglomeration of metropolitan Chennai has an estimated population over 8.2 million people. According to an A.C. Nielsen survey, Chennai is regarded as one of the cleanest cities in India.

The Corporation has developed and maintained a storm water drain network of 334 km in the city along with the maintenance of sixteen canals with the length of 27.92 km. For this study, the drainage channels of the Virugambakkam-Arumbakkam drain and also the Trustpuram storm drain were considered. The Trustpuram channel, located right in the middle of Chennai was taken up for a detailed study. The area comprises of residential and commercial buildings.

The development of a watershed area can strongly impact the natural flow in a stream network during periods of rainfall because of an increase in surface run off. Urban run off increases the concentration of sediment in the stream and can also erode stream banks. The complexity and interactions of flooding and associated pollution resulting from exceedance surface water flows during stream storm events presents a major threat for future sustainable urban drainage management. Urban storm water management must address pluvial flooding and diffuse pollution of varying temporal and spatial scales of operation in order to identify appropriate mitigating and management options. The modelling approaches are described for the detailed delineation and analysis of surface flow paths, flood depths and velocities during such extreme events. The best management practices are used to determine the most cost-effective types and mitigate the flood and pollution in storm drain with stakeholder participation.

The methodology for evaluating the storm water performance of the Trustpuram channel is formulated to fulfil the three objectives of the study. The first objective is concerned with the hydrologic and hydraulic analysis of the storm water flow in the channel. The second objective deals with water quality problems in the channel due to disposal of waste water and sewage from the surrounding residential and built up area. The third objective focused on the attitude of the stakeholders to mitigate the effect of flooding and pollution in the Trustpuram Channel.

The ultimate aim of this study is to identify a Best Management Practice to manage the quantity and improve the quality of storm water runoff in the Trustpuram channel. The Storm Water Management Model the Hydraulic and Hydrologic Analysis and the Water Quality Analysis are used in the thesis.

From the Hydrologic Analysis, the flow direction, watershed delineation, catchment area calculation, Surface Runoff Potential like Permeability, Drainage, Depth to water table, depth and slope are determined and results are generated into a hydrograph. Using the Storm Water Management Model in the Hydrologic Modeling the water utilization, flood control and mitigation, pollution control and mitigation and Consequences of land uses change are identified. Form the Hydraulic Analysis, the pipe length, breadth and diameter are identified. The pipe characteristics, the flow routing and infiltration in hydraulic analysis are also identified.

In The Water Quality Analysis the build up and wash off pollutants are identified and categorized, after which the residential land use develops the Pollutograph. From the Hydrograph and Pollutograph the best storm water management practise is identified through Public Private Participation. The structural measures are used to manage the quantity and improve the quality of storm water run off in the most-efficient manner.

Using the Storm Water Management Model, the Hydrologic Analysis and Water Quality Analysis were carried out in the Trustpuram Channel in Chennai. Thus, the Hydrograph and Pollutograph were generated and suggested as the best storm water management practise in the Trustpuram Channel through Stakeholders' Preception.